



# National Committee on Uniform Traffic Control Devices

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Item No.: 20B-EDIT-01

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

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<b>TECHNICAL COMMITTEE:</b>	Edit Committee
<b>ITEM NUMBER:</b>	20B-EDIT-01
<b>TOPIC:</b>	Speed Terminology
<b>ORIGIN OF REQUEST:</b>	Edit Committee Task Force -- Pline, Wainwright, & Kingsbury
<b>AFFECTED SECTIONS OF MUTCD:</b>	Various Sections in Parts 1, 2, 3, 4, 6, 7, 8, and 9 of 2009 MUTCD

### DEVELOPMENT HISTORY:

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- Approved by Technical Committee: BIK, RW, GMI, MKG, SIG, & RR (06/2017); TTC (04/09/2018); Edit (06/20/2018)
  - Approved by NCUTCD Council: MM/DD/YYYY

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*This is a proposal for recommended changes to the MUTCD that has been developed by a technical committee of the NCUTCD. The NCUTCD is distributing it to its sponsoring organizations for review and comment. Sponsor comments will be considered in revising the proposal prior to NCUTCD Council consideration. This proposal does not represent a revision of the MUTCD and does not constitute official MUTCD standards, guidance, or options. If approved by the NCUTCD Council, the recommended changes will be submitted to FHWA for consideration for inclusion in a future MUTCD revision. The MUTCD can be revised only through the federal rulemaking process.*

### SUMMARY:

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The purpose of this proposal is to revise a variety of Sections in most Parts of the MUTCD so that the way that the various terms describing speed are defined and used will be consistent throughout the manual. This includes references to speed combinations (posted, statutory, operating, speed limit, 85th-percentile); speed ranges (“lower than XX mph” vs “XX mph or lower” and “higher than XX mph” vs “XX mph or higher”); and low speed/high speed.

### DISCUSSION:

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The Edit Committee has the responsibility to review the MUTCD to assure that the wording is consistent in formatting and style. In the past, there has been some discussion on the variety of MUTCD reference to speed and the consideration of more definitive speed references. Currently, the 2009 MUTCD contains the word “speed” 817 times. A Task Force has reviewed the MUTCD relative to the usage of “speed” and has identified the following types of uses:

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- As a title such as a specific device, in an index, Table of Content, or other general reference.

- 36 2. In a definition to specify a definitive value of speed.
- 37 3. As a general term subject to opinion and/or judgment of the reader.
- 38 4. As a portion of various values to identify a specific speed or speed range.

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40 The Task Force reviewed all the MUTCD text, Figures and Tables to understand the broad range  
 41 of the usage of the term speed. It is recognized that the current usage is appropriate in many  
 42 cases leaving the application of a traffic control device subject to individual judgment. However,  
 43 there are inconsistencies between various Parts of the MUTCD where terms are used in a variety  
 44 of formats. The Task Force prepared a series of lists to reflect the speed definitions used in the  
 45 MUTCD, some speed combinations, speed ranges used, and the usage of high/low speed terms.  
 46 The recommendations for each of these categories of usage are as follows:

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48 1. MUTCD Defined Terms -- The following definitions in Section 1A.13 (2009 edition)  
 49 should be consolidated under “Speed,” with some minor revisions for clarity:

- 50 a. 85th-Percentile Speed
- 51 b. Advisory Speed
- 52 c. Average Speed
- 53 d. Design Speed
- 54 e. Maximum Speed Limit
- 55 f. Minimum Speed Limit
- 56 g. Operating Speed
- 57 h. Pace (Pace Speed)
- 58 i. Posted Speed Limit
- 59 j. Posted Speed
- 60 k. Speed Limit
- 61 l. Speed Zone
- 62 m. Statutory Speed Limit

63 2. Terms Defined in MUTCD Text -- The following speed terms are used in only one  
 64 Section and are described or “defined” in that particular Section. It is recommended  
 65 that they be retained without revision in the MUTCD Sections noted (2009 edition  
 66 numbers):

- 67 a. Altered Speed Zone -- 2B.13
- 68 b. LRT Speed -- 8C.01(15)
- 69 c. Speed Differential -- 2C.06
- 70 d. Traffic Signal Speed -- 2H.03
- 71 e. Walking Speed -- 4E.06(07)

72 3. Terms that Do Not Need Defining – The meaning of these speed terms used in the  
 73 MUTCD are considered to be self-evident, adequately found in dictionaries, or  
 74 otherwise not needing a specific MUTCD definition:

- 75 a. low advisory ramp speed
- 76 b. exit speed
- 77 c. minimum legal speed
- 78 d. maximum speed
- 79 e. Within 5 mph of the 85th-percentile speed
- 80 f. 15th-percentile crossing speed of pedestrians
- 81 g. Anticipated Operating Speed

- 82 h. Approach Speed  
83 i. Top Safe Speed  
84 j. Relative Speed  
85 k. Closure Speed  
86 l. 85th-Percentile Approach Speed  
87 m. Bicycle Approach Speed  
88 n. LRT Approach Speed  
89 o. Operating Speed  
90 4. Speed Combinations: The following terms/phrases found in the MUTCD should be  
91 made consistent by using only “Speed Limit or 85th-Percentile Speed”:  
92 a. Posted or 85th-Percentile Speed  
93 b. Posted, 85th-Percentile or Statutory Speed  
94 c. 85th-Percentile or the Posted or Statutory Speed Limit [NOTE: the “Posted or  
95 Statutory” text should be deleted as unnecessary text since the definition of speed  
96 limit covers both.]  
97 5. Speed Limit or 85th-Percentile Speed: The following terms/phrases found in the  
98 MUTCD should be made consistent by using only “Posted Speed Limit, Off-Peak 85th-  
99 Percentile Speed or Anticipated Operating Speed”:  
100 a. Posted Speed or Off-Peak 85th-Percentile Speed  
101 b. Posted Speed Limit, Off-Peak 85th-Percentile Speed, or the Anticipated Speed  
102 c. Posted Speed Limit, Off-Peak 85th-Percentile Speed, or Anticipated Operating  
103 Speed  
104 6. Other Speed Terms: Revise Terms as Shown:  
105 a. anticipated operating speed  
106 b. ~~normal~~-highway operating speed  
107 c. ~~prevailing~~-operating speed  
108 d. ~~recommended~~-advisory speed  
109 e. ~~non-statutory~~-speed limit  
110 7. Speed Ranges: For the following terms found in the MUTCD, the recommended  
111 consistent wording is “XX mph or lower”, except as noted by the asterisks:  
112 a. Less than XX mph, 8C.10\*  
113 b. XX mph or less  
114 c. Below XX mph\*  
115 d. Less than XX mph\*  
116 e. XX mph or lower  
117 i. \*[For these terms, if the sentence only references a posted and /or statutory  
118 speed limit, it is recommended that “XX mph or lower” be used, with XX  
119 being the speed limit value that is 5 mph lower than what is used in the  
120 current language. If the sentence includes a reference to the 85th-percentile  
121 speed or operating speed, the existing language should be retained, because  
122 these types of speeds do not conform to 5 mph increments and to change the  
123 existing language would change the intended meaning.]  
124 8. Speed Ranges: For the following terms found in the MUTCD, the recommended  
125 consistent wording is “XX mph or higher”, except as noted by the asterisks:  
126 a. Exceeds XX mph, 8C.01\*  
127 b. XX mph or more

- 128 c. XX mph or higher  
 129 d. Above XX mph\*  
 130 e. XX mph or greater  
 131 f. Excess of XX mph\*  
 132 g. Higher than XX mph\*  
 133 h. Speeds over XX mph\*  
 134 i. Limit above XX mph  
 135 j. More Than XX mph\*  
 136 k. Greater than XX mph\*  
 137 l. XX mph or greater  
 138 i. \*[For these terms, if the sentence only references a posted and/or statutory  
 139 speed limit, it is recommended that “XX mph or higher” be used with XX  
 140 being the speed limit that is 5 mph higher than what is used in the current  
 141 language. If the sentence includes a reference to the 85th-percentile speed or  
 142 operating speed, the existing language should be retained because these types  
 143 of speeds do not conform to 5 mph increments and to change the existing  
 144 language would change the intended meaning.”]
- 145 9. Low Speed References: The following usages should be retained:  
 146 a. Low speed residential, 6C.04  
 147 b. Urban (low speed), Table 6C-1, 6H-3  
 148 c. Low Speed, 2A.11, Fig. 2D-6, Fig 2D-9, 6H-6  
 149 d. Lower Speeds, 2E.07  
 150 e. Low Speed Limits, 8B.05  
 151 f. Lower Design Speed, 6G.16  
 152 g. Lower operating speeds, 2D.08
- 153 10. For the following usages, revise as shown:  
 154 a. Low speed urban ~~areas~~ roads, 3B.09, 6F.70  
 155 b. Low speed urban ~~streets~~ roads, 6F.17, 6F.61  
 156 c. Low Speed ~~streets~~ urban roads, 2D.47  
 157 d. Low-speed ~~facilities~~ roads, 6F.60, 6H-18  
 158 e. ~~Slow~~ Low-speed ~~facilities~~ roads, Fig. 3B-16  
 159 f. Low speed ~~highway~~ road, 8B.06, 8B.27  
 160 g. Low speed road~~way~~, 2A.06, 6F.64, 6G.08, 6HY.26  
 161 h. ~~On~~ Low-speed ~~areas~~ 2D.31
- 162 11. High Speed References: The following usages should be retained:  
 163 a. High Speed, 2A.11, 2E.01, 6F.61, 6G.02, 6G.14, 6G.19, 6H-31, 6H-32, 6H- 39  
 164 b. Higher speeds, 6C.04  
 165 c. Speeds are high, 2D.30  
 166 d. High speed traffic, 2A.17  
 167 e. High Speed approaches, 2B.43, 4J.03  
 168 f. High approach speed, 4D.07  
 169 g. Urban (high speed), Table 6C-1, 6H-3  
 170 h. High speed freeway & expressway, 2E.01, 6F.68  
 171 i. High speed highway, 4D.1, 4J.02, 6F.64,
- 172 12. For the following usages, revise as shown:  
 173 a. High speed ~~areas~~ roads, 2D.31, 2D.40

- 174 b. Higher speed ~~applications roads~~, 2A.11
- 175 c. High speed ~~streets roads~~, 6C.04
- 176 d. High speed ~~freeway &~~ expressway, 6F.68
- 177 e. High speed ~~roadway highway~~, 6C.07, 6F.68, 6G.07, 6H.35 [NOTE: roadway does
- 178 not include shoulders ]

180 **RECOMMENDED MUTCD CHANGES**

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182 The following present the proposed changes to the current MUTCD within the context of the

183 current MUTCD language. Proposed additions to the MUTCD are shown in blue underline and

184 proposed deletions from the MUTCD are shown in ~~red strikethrough~~. Changes previously

185 approved by NCUTCD Council (but not yet adopted by FHWA) are shown in green double

186 underline for additions and ~~green double strikethrough~~ for deletions. In some cases, background

187 comments may be provided with the MUTCD text. These comments are indicated by

188 highlighted light blue in brackets.

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190 **PART 1 - GENERAL**

191

192 ~~Section 1A.13. Definition of Headings, Words, and Phases Used in this Manual~~

193 [Existing Section 1A.13 has been split up into two separate sections, 1C.01 for Headings and

194 1C.02 for Words and Phrases]

195 Section 1C.02 Definitions of Words and Phrases Used in this Manual

196 Standard:

197 01 Unless otherwise defined in this Section, or in other Parts of this Manual, words or

198 phrases shall have the meaning(s) as defined in the most recent editions of the “Uniform

199 Vehicle Code,” “AASHTO Transportation Glossary (Highway Definitions),” and other

200 publications mentioned in Section ~~1A.11~~1A.04.

201 02 The following words and phrases, when used in this Manual, shall have the following

202 meanings:

203 ~~8. Advisory Speed—a recommended speed for all vehicles operating on a section of~~

204 ~~highway and based on the highway design, operating characteristics, and conditions.~~

205 [Relocated under speed definitions.]

206 ~~10. Altered Speed Zone—a speed limit, other than a statutory speed limit that is based~~

207 ~~upon an engineering study.~~ [Definition is deleted since it is defined and only used in

208 Section 2B.13.]

209 128. Open-Road ETC Lane—a non-attended lane that is designed to allow toll payments to

210 be electronically collected from vehicles traveling at ~~normal~~-highway operating

211 speeds. Open-Road ETC lanes are typically physically separated from the toll plaza,

212 often following the alignment of the mainline lanes, with toll plaza lanes for cash toll

213 payments being on a different alignment after diverging from the mainline lanes or a

214 subset thereof.

215 129. Open-Road Tolling—a system designed to allow electronic toll collection (ETC) from

216 vehicles traveling at ~~normal~~-highway operating speeds. Open-Road Tolling might be

217 used on toll roads or toll facilities in conjunction with toll plazas. Open-Road Tolling

218 is also typically used on managed lanes and on toll facilities that only accept payment

219 by ETC.

- 220 132a Pace—see Speed. [Approved 1/11/2019, 18B-RW-03]
- 221 ~~151. Posted Speed Limit—a speed limit determined by law or regulation and displayed on~~
- 222 ~~Speed Limit signs.~~ [Relocated under speed definitions and revised.]
- 223 214. Speed—speed is defined based on the following classifications:
- 224 (a) Average Speed—the summation of the instantaneous or spot-measured speeds at a
- 225 specific location of vehicles divided by the number of vehicles observed.
- 226 (b) Advisory Speed—a recommended speed for all vehicles operating on a section of
- 227 highway and based on the highway design, operating characteristics, and
- 228 conditions.
- 229 ~~(b)(c)~~ Design Speed—a selected speed used to determine the various geometric design
- 230 features of a roadway.
- 231 ~~(e)(d)~~ 85th-Percentile Speed—the speed at or below which 85 percent of the motor
- 232 vehicles travel.
- 233 ~~(d)(e)~~ Operating Speed—a speed at which a typical vehicle or the overall traffic
- 234 operates as determined by engineering judgment. Operating speed might be
- 235 ~~defined with~~ characterized by speed values such as the average, pace, or 85th-
- 236 percentile speeds.
- 237 ~~(e)(f)~~ Pace—the 10 mph speed range representing the speeds of the largest percentage
- 238 of vehicles in the traffic stream.
- 239 (g) Posted Speed Limit—a speed limit determined by law or regulation and the
- 240 applicable speed limit displayed on Speed Limit signs.
- 241 (h) Speed Limit—the maximum (or minimum) speed applicable to a section of
- 242 highway as established by law, or regulation, ordinance or as adopted by the
- 243 agency with jurisdiction based on an engineering study.
- 244 (i) Speed Zone—a section of highway with an established and posted speed limit, that
- 245 is established by law or regulation, but which might be different from a
- 246 legislatively specified statutory speed limit.
- 247 (j) Statutory Speed Limit—a speed limit established by legislative action (e.g., Federal
- 248 or State Law) that typically is applicable for a particular class of highways with
- 249 specified design, functional, jurisdictional and/or location characteristics and that
- 250 is not necessarily displayed on Speed Limit signs. [Approved 1/11/2013, 13A-RW-
- 251 02]
- 252 ~~215. Speed Limit—the maximum (or minimum) speed applicable to a section of highway~~
- 253 ~~as established by law or regulation.~~ [Relocated under Speed Definitions and revised]
- 254 ~~218. Speed Zone—a section of highway with a speed limit that is established by law or~~
- 255 ~~regulation, but which might be different from a legislatively specified statutory speed~~
- 256 ~~limit.~~ [Revised and relocated under Speed Definitions]
- 257 ~~221. Statutory Speed Limit—a speed limit established by legislative action (e.g. Federal or~~
- 258 ~~state law), that typically is applicable for a particular class of highways with specified~~
- 259 ~~design, functional, jurisdictional and/or location characteristics and that is not~~
- 260 ~~necessarily displayed on Speed Limit signs.~~ [Relocated under Speed Definitions]
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263 PART 2 -- SIGNS

264 CHAPTER 2A. GENERAL

265 Section 2A.11 Dimensions

266 Standard:

267 02 The sign dimensions prescribed in the sign size tables in the various Parts and  
268 Chapters in this Manual and in the “Standard Highway Signs and Markings” book (see  
269 Section 1A.11) shall be used unless engineering judgment determines that other sizes are  
270 appropriate. Except as provided in Paragraph 3, where engineering judgment determines  
271 that sizes smaller than the prescribed dimensions are appropriate for use, the sign  
272 dimensions shall not be less than the minimum dimensions specified in this Manual. The  
273 sizes shown in the Minimum columns that are smaller than the sizes shown in the  
274 Conventional Road columns in the various sign size tables in this Manual shall only be used  
275 on low-speed ~~roadways~~ roads as determined by the highway agency, alleys, ~~and private~~  
276 ~~roads-site roadways~~ open to public travel and on low-volume rural roads with operating  
277 speeds of 30 mph or less where the reduced legend size would be adequate for the  
278 regulation or warning or where physical conditions preclude the use of larger sizes.

279 [Approved 1/10/2014, 13B-RW-01 & 6/09/16, 15A-EC-01]

280 Guidance:

281 04 The sizes shown in the Freeway and Expressway columns in the various sign size tables in  
282 this Manual should be used on freeways and expressways, and for other higher-speed  
283 ~~applications-roads~~ based upon engineering judgment, to provide larger signs for increased  
284 visibility and recognition.

285 Option:

286 08a SROPT: The minimum sign sizes for site roadways open to public travel with operating  
287 speeds less than 25 mph or lower may be 6 inches less in both width and height than the single-  
288 lane conventional road shown in Tables 2B-1 and 2C-2 (but not less than 18 inches high or 9  
289 inches wide). This does not apply to supplemental plaques. Where a Site Roadway open to  
290 public travel intersects with a street or highway, the sign size for the regulatory STOP or YIELD  
291 sign shall be sizes shown in Table 2B-1. [Approved 1/8/2016, 15A-RW-02]

292 Section 2A.16. Standardization of Location

293 Standard:

294 03 Signs requiring separate decisions by the road user shall be spaced sufficiently far  
295 apart for the appropriate decisions to be made. One of the factors considered when  
296 determining the appropriate spacing shall be the ~~posted~~ speed limit or 85th-percentile  
297 speed.

300 CHAPTER 2B. REGULATORY SIGNS, BARRICADES, AND GATES

301 Section 2B.03 Size of Regulatory Signs

302 Standard:

303 03a The typical size of regulatory signs applied on low-volume rural roads with operating  
304 speeds of 30 mph or less-lower shall be in accordance with the minimum column of Table  
305 2B-1. [Approved 1/10/2014, 13B-RW-04]

309 Option:  
310 09b SROPT: The minimum sign size for site roadways open to public travel with operating  
311 speeds ~~less than~~ 25 mph or lower may be 6 inches less in both width and height than the single-  
312 lane conventional road size except for supplemental plaques identified by “P” in the sign  
313 designation in Table 2B-1. [Approved 1/08/2016, 15A-RW-02]  
314

315 **Section 2B.04j. All-Way Stop Control Criteria D: 8 Hour Volume (Vehicle, Pedestrian,**  
316 **Bicycles) [Approved 1/08/2016, 15B-RW-02]**

317 Option:  
318 01 All-way stop control may be established at an intersection where an engineering study  
319 indicates:  
320 A. The volume entering the intersection from the major street approaches (total of both  
321 approaches) averages at least 300 units per hour for any 8 hours of an average day; and  
322 B. The volume entering the intersection from the minor street approaches (total of both  
323 approaches) averages at least 200 units per hour for the same 8 hours; but  
324 C. If the 85th-percentile approach speed of the major street traffic ~~exceeds 40 mph~~ is 45  
325 mph or higher, the minimum vehicular volume criteria are 70 percent of the values in  
326 Items A and B.

327 20a SROPT: At the junction of two site roadways open to public travel when the operating  
328 speeds are ~~less than~~ 25 mph or lower on both roadways, a STOP or YIELD sign may be installed  
329 at a location on other than the right hand side as necessitated by physical constraints. At the ends  
330 of driving aisles connecting site roadways open to public travel, the word STOP on the pavement  
331 when accompanied with a stop line may be used in the place of a STOP sign. [Approved  
332 1/08/2016, 15A-RW-02]  
333

334 **Section 2B.10 STOP Sign or YIELD Sign Placement**

335 Option:  
336 20a SROPT: At the junction of two site roadways open to public travel when the operating  
337 speeds are ~~less than~~ 25 mph or lower on both roadways, a STOP or YIELD sign may be installed  
338 at a location on other than the right hand side as necessitated by physical constraints.  
339 At the ends of driving aisles connecting site roadways open to public travel, the word STOP on  
340 the pavement when accompanied with a stop line may be used in the place of a STOP sign.  
341 [Approved 1/08/2016, 15A-RW-02]  
342

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

344 Guidance:  
345 01a+6 ~~Other factors~~ Factors that ~~may~~ should be considered when establishing or reevaluating  
346 speed limits within speed zones are the following:  
347 A. Speed distribution of free-flowing vehicles (such as current 85th percentile, the pace,  
348 and review of past speed studies)  
349 B. Reported crash experience for at least a 12-month period relative to similar roadways.  
350 C. Road characteristics (such as lane widths, curb/shoulder condition, grade, alignment,  
351 median type, and sight distance).  
352 D. Road context (such as roadside development and environment including number of  
353 driveways and land use, functional classification, parking practices, presence of  
354 sidewalks/bicycle facilities).



355 E. Road Users (such as pedestrian activity, bicycle activity)  
356 01b+2 When a speed limit within a speed zone is posted on freeways, expressways, or rural  
357 highways, it should maximize the percentage of vehicles in the pace and should be within 5 mph  
358 of the 85th-percentile speed of free-flowing traffic vehicles.

359 01c+0 States and local agencies should conduct engineering studies to reevaluate ~~non-statutory~~  
360 speed limits on segments of their roadways that have undergone significant changes since the  
361 last review, (such as in road geometrics, road context, the addition or elimination of parking or  
362 driveways, changes in the number of travel lanes, changes in the configuration of bicycle lanes,  
363 changes in traffic control signal coordination, or significant changes in traffic volumes).

364 [Paragraphs moved and revised, Approved 1/11/2019, 18B-RW-03]

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### 366 **Section 2B.30 KEEP RIGHT EXCEPT TO PASS (R4-16) and SLOWER TRAFFIC KEEP** 367 **RIGHT Sign (R4-3)**

368 *Guidance:*

369 04 If used, the SLOWER TRAFFIC KEEP RIGHT sign should be installed ~~just beyond~~ at the  
370 beginning of a multi-lane ~~pavement~~ highway, and at selected locations where there is a tendency  
371 on the part of some road users to drive in the left-hand lane (or lanes) below the ~~normal~~  
372 operating speed of traffic. This sign should not be used on the approach to an interchange or  
373 through an interchange area [Approved 1/8/2016, 15B-RW-01]

374

### 375 **Section 2B.37 DO NOT ENTER Sign (R5-1)**

376 04 SROPT: A DO NOT ENTER sign may be omitted only if an R4-7 or R6-1 sign is installed  
377 for divided roadway median openings when the operating speeds are less than 25 mph or lower  
378 on a SITE ROADWAY OPEN TO PUBLIC TRAVEL. [Approved 1/08/2016, 15A-RW-02]

379

### 380 **Section 2B.42 Divided Highway Crossing Signs (R6-3, R6-3a)**

381 *Option:*

382 02 If the divided highway ~~that has a median width at the intersection itself of 30 feet or more~~  
383 has a traffic volume of less than 400 AADT and a speed limit of 25 mph or ~~less~~ lower, the  
384 Divided Highway Crossing signs facing the unsignalized minor-street approaches may be  
385 omitted. [Approved 6/21/2019, 19A-RW-01]

386

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

388 *Option:*

389 05 More than one Roundabout Directional Arrow sign and/or R6-4a or R6-4b signs may be  
390 used facing high-speed (as determined by the highway agency) approaches, facing approaches  
391 with limited visibility, or in other circumstances as determined by engineering judgment where  
392 increased sign visibility would be appropriate.

393

## 394 **CHAPTER 2C. WARNING SIGNS AND OBJECT MARKERS**

395

### 396 **Section 2C.04 Size of Warning Signs**

397 *Standard:*

398 03 Except as provided in Paragraph 5, the minimum size for all diamond-shaped warning  
399 signs facing traffic on a multi-lane conventional road where the posted speed limit is ~~higher~~  
400 ~~than 35 mph~~ 40 mph or higher shall be 36 x 36 inches.

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

Posted Speed Limit or 85th-Percentile Speed	Advance Placement Distance <sup>1</sup>								
	Condition A: Speed reduction and lane changing in heavy traffic <sup>2</sup>	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0 <sup>3</sup>	10 <sup>4</sup>	20 <sup>4</sup>	30 <sup>4</sup>	40 <sup>4</sup>	50 <sup>4</sup>	60 <sup>4</sup>	70 <sup>4</sup>
20 mph <u>or less</u> <u>lower</u>	225 ft	<del>100</del> 115 ft <sup>6</sup>	N/A <sup>5</sup>	—	—	—	—	—	—
25 mph	325 ft	<del>100</del> 155 ft <sup>6</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	—	—	—	—	—
30 mph	460 ft	<del>100</del> 200 ft <sup>6</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	—	—	—	—	—
35 mph	565 ft	<del>100</del> 250 ft <sup>6</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	—	—	—	—
40 mph	670 ft	<del>125</del> 305 ft	100 ft <sup>6</sup>	100 ft <sup>6</sup>	N/A <sup>5</sup>	—	—	—	—
45 mph	775 ft	<del>175</del> 360 ft	125 ft	100 ft <sup>6</sup>	100 ft <sup>6</sup>	N/A <sup>5</sup>	—	—	—
50 mph	885 ft	<del>250</del> 425 ft	200 ft	175 ft	125 ft	100 ft <sup>6</sup>	—	—	—
55 mph	990 ft	<del>325</del> 495 ft	275 ft	225 ft	200 ft	125 ft	N/A <sup>5</sup>	—	—
60 mph	1,100 ft	<del>400</del> 570 ft	350 ft	325 ft	275 ft	200 ft	100 ft <sup>6</sup>	—	—
65 mph	1,200 ft	<del>475</del> 645 ft	450 ft	400 ft	350 ft	275 ft	200 ft	100 ft <sup>6</sup>	—
70 mph	1,250 ft	<del>550</del> 730 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	—
75 mph <u>or higher</u>	1,350 ft	<del>650</del> 820 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft <sup>6</sup>

[20 or less in table above approved 1/08/2016, 15A-RW-02]

- The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is appropriate for an alignment warning symbol sign. For Conditions A and B, warning signs with less than 6-inch legend or more than four words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.
- Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2005 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.
- Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2005 AASHTO Policy, Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second<sup>2</sup>, minus the sign legibility distance of 180 feet. [Approved 6-22-12, 12A-RW-02]
- Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second<sup>2</sup>, minus the sign legibility distance of 250 feet.
- No suggested distances are provided for these speeds, as the placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other signs.
- The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

403 **Section 2C.06 Horizontal Alignment Signs Treatments for Changes in Horizontal**  
404 **Alignment**

405 Option`  
406 02 The following list identifies treatments (traffic control devices and non-traffic control  
407 devices) that may be used in advance of or within a change in horizontal alignment.

408 **Standard:**  
409 ~~02 In advance of horizontal curves on freeways, on expressways, and on roadways with~~  
410 ~~more than 1,000 AADT that are functionally classified as arterials or collectors, horizontal~~  
411 ~~alignment warning signs shall be used in accordance with Table 2C-5 based on the speed~~  
412 ~~differential between the roadway's posted or statutory speed limit or 85th percentile speed,~~  
413 ~~whichever is higher, or the prevailing speed on the approach to the curve, and the~~  
414 ~~horizontal curve's advisory speed.~~ [Approved 1/20/2011, 15B-RW-05 and 6/22/2018, 17B-  
415 RW-01]

417 **Section 2C.06a Device Selection for Changes in Horizontal Alignment**

418 Option:  
419 0906 Devices for changes in horizontal alignment may be omitted when the speed limit on the  
420 approach to an alignment change is 20 mph or ~~less~~ lower. [Approved 6/22/2018, 17B-RW-01]

422 **Table 2C-6. Typical Spacing of Chevron Alignment Signs on Horizontal Curves**

Advisory Speed	Curve Radius	Sign Spacing
15 mph or <del>less</del> lower	Less than 200 feet	40 feet
20 to 30 mph	200 to 400 feet	80 feet
35 to 45 mph	401 to 700 feet	120 feet
50 to 60 mph	701 to 1,250 feet	160 feet
<del>More than 60 mph</del> 65 mph or higher	More than 1,250 feet	200 feet

Note: The relationship between the curve radius and the advisory speed shown in this table should not be used to determine the advisory speed.

423  
424 **Section 2C.46 Intersection Warning Signs (W2-1 through W2-8)**

425 Guidance:  
426 03 If an approach to a roundabout has a ~~statutory or posted~~ speed limit of 40 mph or higher,  
427 the Circular Intersection (W2-6) symbol sign should be installed in advance of the circular  
428 intersection.

430 **CHAPTER 2D. GUIDE SIGNS – CONVENTIONAL ROADS**

432 **Section 2D.01 Scope of Conventional Road Guide Sign Standards**

433 Option:  
434 02 SROPT: Except as noted in Section 1A.03, for site roadways open to public travel with  
435 operating speeds of ~~less than 25 miles per hour~~ 25 mph or lower, deviation from the provisions  
436 of this Chapter may be modified. [Approved 1/18/2015, 15A-EC-01]

441 **Section 2D.31 Advance Route Turn Assembly**

442 *Guidance:*

443 05 ~~In low-speed areas~~ On low-speed roads, the Advance Route Turn assembly should be  
444 installed not less than 200 feet in advance of the turn. ~~In high-speed areas~~ On high-speed roads,  
445 the Advance Route Turn assembly should be installed not less than 300 feet in advance of the  
446 turn. In rural areas, the minimum distance between an Advance Route Turn assembly and either  
447 a Destination sign or a Junction assembly should be 200 feet.

448  
449 **Section 2D.40 Location of Destination Signs**

450 *Guidance:*

451 01 When used ~~in high-speed areas~~ on high-speed roads, Destination signs should be located  
452 200 feet or more in advance of the intersection, and following any Junction or Advance Route  
453 Turn assemblies that might be required. In rural areas, the minimum distance between a  
454 Destination sign and either an Advance Route Turn assembly or a Junction assembly should be  
455 200 feet.

456  
457 **Section 2D.43 Street Name Signs ( D3-1 and D3-1a)**

458 *Guidance:*

459 04 Lettering on post-mounted Street Name signs should be composed of initial upper-case  
460 letters at least 6 inches in height and lower-case letters at least 4.5 inches in height.  
461 05 On multi-lane streets with speed limits ~~greater than 40 mph~~ of 45 mph or higher, the lettering  
462 on post-mounted Street Name signs should be composed of initial upper-case letters at least 8  
463 inches in height and lower-case letters at least 6 inches in height.

464  
465 **Table 2D-2. Recommended Minimum Letter Heights on Street Name Signs**

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	<del>More than 40 mph</del> <u>45 mph or higher</u>	8 inches	6 inches
Post-mounted	Multi-lane	40 mph or <del>less</del> <u>lower</u>	6 inches	4.5 inches
Post-mounted	2-lane	All speed limits	6 inches*	4.5 inches*

\* On local two-lane streets with speed limits of 25 mph or ~~less~~ lower, 4-inch initial upper-case letters with 3-inch lower-case letters may be used.

466  
467 **Section 2D.47 Parking Area Guide Sign (D4-1)**

468 **Standard:**

469 02 If used, the Parking Area (D4-1) guide sign shall be a horizontal rectangle with a  
470 standard size of 30 x 24 inches, or with a smaller size of 18 x 15 inches for minor, low-speed  
471 ~~streets~~ roads. It shall carry the word PARKING, with the letter P five times the height of  
472 the remaining letters, and a directional arrow.

475 CHAPTER 2H. GENERAL INFORMATION SIGNS

476  
477 **Section 2H.08 Acknowledgment Signs**

478 *Guidance:*

479 05 *The minimum spacing between acknowledgment signs and any other traffic control signs,*  
480 *except parking regulation signs, should be:*

- 481 A. 150 feet on roadways with speed limits of ~~less than 30 mph~~ 25 mph or lower
- 482 B. 200 feet on roadways with speed limits of 30 to 45 mph, and
- 483 C. 500 feet on roadways with speed limits ~~greater than 45 mph~~ of 50 mph or higher.

484  
485 CHAPTER 2L. CHANGEABLE MESSAGE SIGNS

486  
487 **Section 2L.04 Design Characteristics of Changeable Message Signs**

488 *Guidance:*

489 06 *Except as provided in Paragraph 18, word messages on changeable message signs should*  
490 *be composed of all upper-case letters. The minimum letter height should be 18 inches for*  
491 *changeable message signs on roadways with speed limits of 45 mph or higher. The minimum*  
492 *letter height should be 12 inches for changeable message signs on roadways with speed limits of*  
493 ~~*less than 45 mph*~~ *40 mph or lower.*

494  
495 CHAPTER 2M. RECREATIONAL AND CULTURAL INTEREST AREA SIGNS

496  
497 **Section 2M.05 Symbol Sign Sizes**

498 *Option:*

499 03 A smaller size of 18 X 18 inches may be used on low-speed, low-volume roadways, on site  
500 roadways open to public travel with operating speeds less than 25 mph of 25 mph or lower, and  
501 on non-road applications. [Approved 1/08/2016, 16A-GMI-02]

502  
503 **PART 3 – MARKINGS**

504  
505 **CHAPTER 3A. GENERAL**

506  
507 **Section 3A.06 Functions, Widths, and Patterns of Longitudinal Pavement Markings**

508 *Standard:*

509 02 **The widths and patterns of longitudinal lines shall be as follows:**

- 510 A. **Normal line—**~~4 to 6 inches wide~~ for Interstate, freeway, expressway and corresponding  
511 ramp interchange markings and for edge lines on all other roadways with posted or  
512 statutory speeds of 55 mph or more higher and an ADT of 6,000 vehicles per day or  
513 greater; otherwise, a normal line shall be 4 to 6 inches wide. [Approved 1/9/2020, 19B-  
514 MKG-02]

CHAPTER 3B. PAVEMENT AND CURB MARKINGS

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

Standard:

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 ~~85th-percentile speed or the posted or statutory speed limit~~ or 85th-percentile speed. 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).

Guidance:

14 For three-lane roadways having a ~~posted or statutory~~ speed limit of 45 mph or ~~greater higher~~, the lane transition taper length should be computed by the formula  $L = WS$ . For roadways where the ~~posted or statutory~~ speed limit is ~~less than 45 mph~~ 40 mph or lower, the formula  $L = WS^2/60$  should be used to compute the taper length .

Support:

15 Under both formulas, L equals the taper length in feet, W equals the width of the center lane or offset distance in feet, and S equals the ~~85th-percentile speed or the posted or statutory~~ speed limit or 85th-percentile speed, whichever is higher.

Guidance:

16 The minimum lane transition taper length should be 100 feet in urban areas and 200 feet in rural areas.

Option:

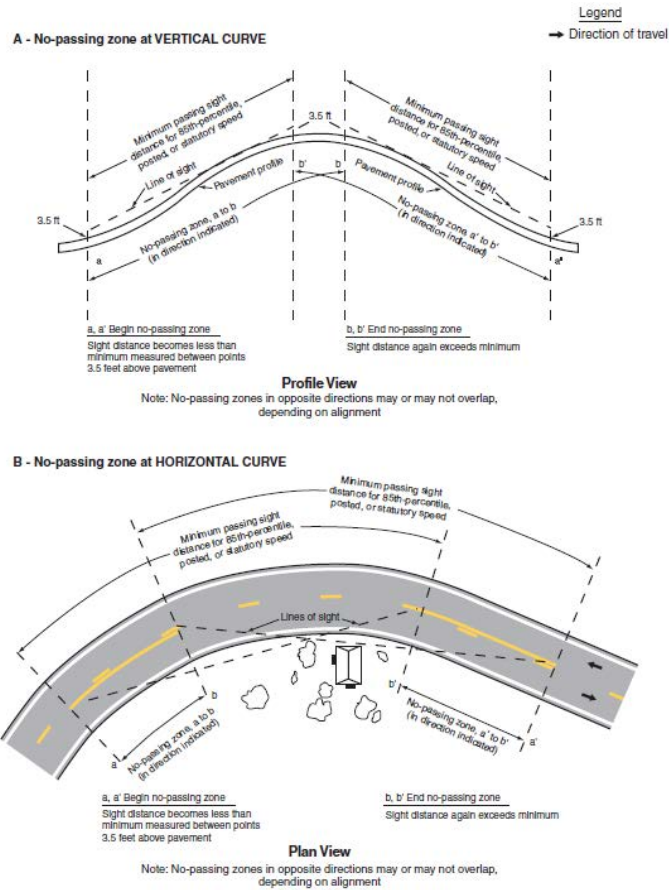
17 SROPT: Based on engineering judgment, the minimum taper length may be less than 100 feet on site roadways open to public travel where the operating speed is less than 25 mph or lower. [Approved 1/08/2016, 16A-MKG-01]

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

<del>85th-Percentile or Posted or Statutory</del> Speed Limit <u>or 85th-Percentile Speed</u>	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

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**Figure 3B-4 Method of Locating and Determining the Limits of No-Passing Zones at Curves**



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[Modify the notes on the drawing as follows:]

**A-No-passing zone at VERTICAL CURVE**

Note on Drawing: Minimum passing sight distance for ~~85th-percentile, posted or statutory~~-speed limit or 85th-percentile speed

**B – No-passing zone at HORIZONTAL CURVE**

Note on Drawing: Minimum passing sight distance for ~~85th-percentile, posted or statutory~~-speed limit or 85th-percentile speed

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

Option:

03 On low-speed urban ~~roadways~~-roads and on site roadways open to public travel with operating speeds less than 25 mph of 25 mph or lower 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. [Approved 6/09/16, 15A-EC-01]

Guidance:

04 For roadways having a ~~posted or statutory~~-speed limit of 45 mph or ~~greater~~ higher, 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~~ 40 mph or lower, the formula  $L = WS^2/60$  should be used to compute the taper length.

573 Support:  
 574 05 Under both formulas, L equals the taper length in feet, W equals the width of the offset  
 575 distance in feet, and S equals the ~~85th-percentile speed or the posted or statutory~~ speed limit, or  
 576 85th-percentile speed, whichever is higher.

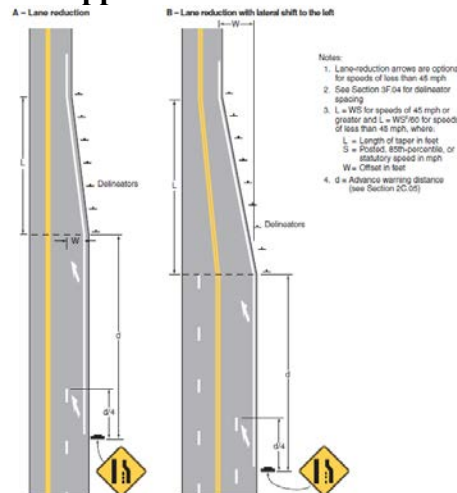
577 Option:  
 578 05a SROPT: Based on engineering judgment, the minimum taper length may be less than 100  
 579 feet on site roadways open to public travel where the operating speed is ~~less than 25 mph or~~  
 580 lower. [Approved 6/09/16, 15A-EC-01]

581 Guidance:  
 582 06 Where ~~observed operating~~ speeds exceed ~~posted or statutory~~ speed limits, longer tapers  
 583 should be used.

584 Option:  
 585 07 On new construction, where no ~~posted or statutory~~ speed limit has been established, the  
 586 design speed may be used in the transition taper length formula.

587 Guidance:  
 588 08 Lane line markings should be discontinued one-quarter of the distance between the Lane  
 589 Ends sign (see Section 2C.42) and the point where the transition taper begins.  
 590 09 Except as provided in Paragraph 3 for low-speed urban ~~roadway~~ roads, the edge line  
 591 markings shown in Figure 3B-14 should be installed from the location of the Lane Ends warning  
 592 sign to beyond the beginning of the narrower roadway.

594 **Figure 3B-14. Examples of Applications of Lane-Reduction Transition Markings**



595 [Modify notes on the figure as follows:]

596 Notes:

- 597
- 598 1. Lane-reduction arrows are optional for speeds ~~limits~~ of 40 mph or lower ~~less than~~  
 599 45 mph
  - 600 2. See Section 3F.04 for delineator spacing
  - 601 3. L = WS for speeds of 45 mph or greater higher and L = WS<sup>2</sup>/60 for speeds of ~~less~~  
 602 than 45 mph 40 mph or lower, where:  
 603 L = Length of taper in feet;  
 604 S = Speed limit or Posted, ~~85th-percentile, or statutory~~ speed in mph  
 605 W = Offset in feet.
  - 606 4. d = Advance warning distance (see Section 2C.05).



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### **Section 3B.10 Approach Markings for Obstructions**

Guidance:

03 For roadways having a ~~posted or statutory~~ speed limit of 45 mph or ~~greater~~ higher, the taper length of the tapered line markings should be computed by the formula  $L = WS$ . For roadways where the ~~posted or statutory~~ speed limit is ~~less than 45 mph~~ 40 mph or lower, the formula  $L = WS^2/60$  should be used to compute the taper length.

Support:

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

Guidance:

05 The minimum taper length should be 100 feet in urban areas and 200 feet in rural areas.

Option:

05a SROPT: Based on engineering judgement, the minimum taper length may be less than 100 feet on site roadways open to public travel where the operating speed is less than 25 mph or lower. [Approved 1/08/2016, 16A-MKG-01]

### **Figure 3B-15. Examples of Applications of Markings for Obstructions in the Roadway** (Sheets 1 and 2) [Modify notes on both figures as follows:]

Notes:

For speeds 45 mph or ~~more~~ higher:  $L = WS$

For speeds 40 mph or ~~more~~ lower:  $L = WS^2/60$

S = ~~Posted, Speed limit or~~ 85th-percentile, ~~or statutory~~ speed in mph

W = Offset distance in feet

### **Section 3B.18 Crosswalk Markings**

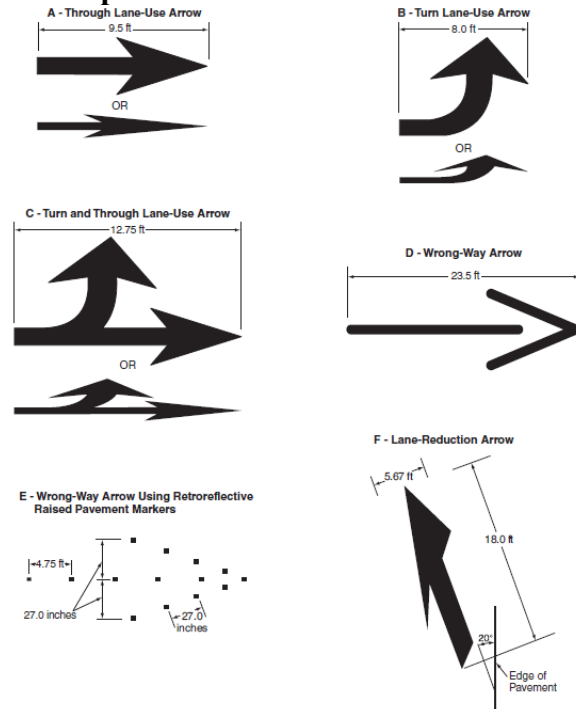
Guidance:

08 Crosswalk lines should not be used indiscriminately. An engineering study should be performed before a marked crosswalk is installed at a location away from a traffic control signal or an approach controlled by a STOP or YIELD sign. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), ~~posted or statutory~~ speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.

09 New marked crosswalks alone, without other measures designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence, should not be installed across uncontrolled roadways where ~~the speed limit exceeds 40 mph and either~~ any of the following conditions exist:

- A. The roadway has four or more lanes of travel without a raised median or pedestrian refuge island and an ADT of 12,000 vehicles per day or greater; or
- B. The roadway has four or more lanes of travel with a raised median or pedestrian refuge island and an ADT of 15,000 vehicles per day or greater; or
- C. The speed limit exceeds 35 mph is 40 mph or higher. [Approved 1/19/2012, 12A-MKG-02]

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



- Notes:
1. Typical sizes for normal installation; sizes may be reduced approximately one-third for low-speed urban conditions; larger sizes may be needed for freeways, above average speeds, and other critical locations.
  2. The narrow elongated arrow designs shown in Drawings A, B, and C are optional.
  3. For proper proportion, see the Pavement Markings chapter of the "Standard Highway Signs and Markings" book (see Section 1A.11).

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[Modify first note on the figure as follows:]

657

Notes:

658

1. Typical sizes for normal installations; sizes may be reduced approximately one-third for low-speed urban ~~conditions~~ roads; larger sizes may be needed for freeways, ~~above average~~ speeds, and other critical locations.

659

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

663

Option:

664

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

665

666

12a SROPT: On site roadways open to public travel where the operating speed is less than 25 mph or lower, the pavement words, symbols, and arrows may be reduced in size to less than 1/4 size, but in relative proportion to the associated full-size word, symbol, or arrow. [Approved 6/09/16, 15A-EC-01]

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671

Guidance:

672

34 Where a lane-reduction transition occurs on a roadway with a speed limit of 45 mph or ~~more~~ higher, the lane-reduction arrow markings shown in Drawing F in Figure 3B-24 should be used (see Figure 3B-14). Except for acceleration lanes, where a lane-reduction transition occurs on a roadway with a speed limit of ~~less than 45 mph~~ 40 mph or lower, the lane-reduction arrow markings shown in Drawing F in Figure 3B-24 should be used if determined to be appropriate based on engineering judgment.

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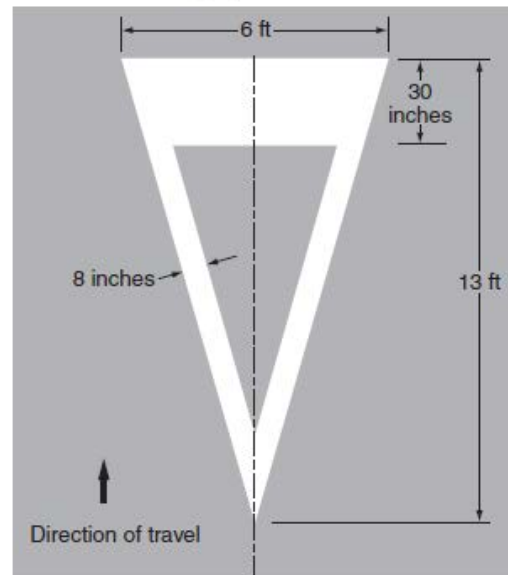
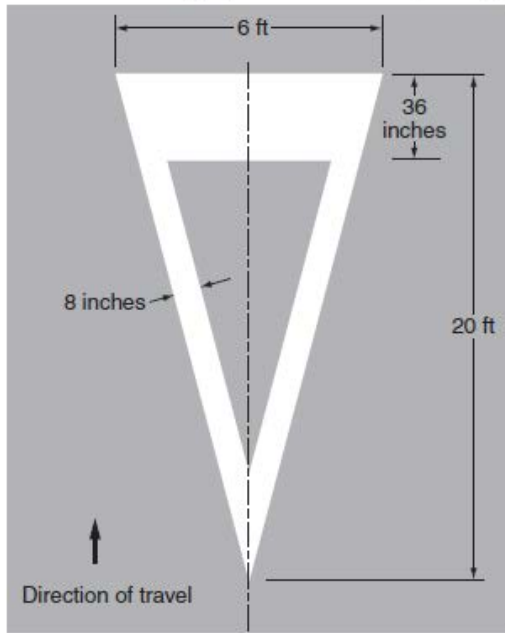
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Figure 3B-26 Yield Ahead Triangle Symbols

A - Posted or Statutory Speed Limit of 45 mph or greater

B - Posted or Statutory Speed Limit of less than 45 mph



681

Change headings to:

682

683 A - ~~Posted or Statutory~~ Speed Limit of 45 mph or ~~greater~~ higher

684 B - ~~Posted or Statutory~~ Speed Limit of ~~less than 45 mph~~ 40 mph or lower

685

### 686 Section 3B.24 Chevron and Diagonal Crosshatch Markings

687

Guidance:

688

05 The chevrons and diagonal lines used for crosshatch markings should be at least 12 inches wide for roadways having a ~~posted or statutory~~ speed limit of 45 mph or ~~greater~~ higher and at least 8 inches wide for roadways having ~~posted or statutory~~ speed limits of ~~less than 45 mph~~ 40 mph or lower. The longitudinal spacing of the chevrons or diagonal lines should be determined by engineering judgment considering factors such as speeds and desired visual impacts. The chevrons and diagonal lines should form an angle of approximately 30 to 45 degrees with the longitudinal lines that they intersect.

695

06 SROPT: Chevrons and diagonal lines used for crosshatch markings should be at least 4 inches wide on site roadways open to public travel where the operating speed is ~~less than~~ 25 mph or lower. [Approved 6/09/16, 15A-EC-01]

696

697

## CHAPTER 3D. MARKINGS FOR PREFERENTIAL LANES

698

699

### 700 Section 3D.01 Preferential Lane Word and Symbol Markings

701

Guidance:

702

09 The spacing of the markings should be based on engineering judgment that considers the ~~prevailing operating~~ speed, block lengths, distance from intersections, and other factors that affect clear communication to the road user.

703

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708 **PART 4 – HIGHWAY TRAFFIC SIGNALS**

709 **CHAPTER 4C. TRAFFIC CONTROL SIGNAL NEEDS STUDIES**

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

711 Option:

712 17 Engineering study data may include the following:

- 713 A. The number of vehicles entering the intersection in each hour from each approach during 12
- 714 hours of an average day. It is desirable that the hours selected contain the greatest percentage
- 715 of the 24-hour traffic volume.
- 716 B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type
- 717 (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations,
- 718 bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the
- 719 afternoon during which total traffic entering the intersection is greatest.
- 720 C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts
- 721 in Item B and during hours of highest pedestrian volume. Where young, elderly, and/or
- 722 persons with physical or visual disabilities need special consideration, the pedestrians and
- 723 their crossing times may be classified by general observation.
- 724 D. Information about nearby facilities and activity centers that serve the young, elderly, and/or
- 725 persons with disabilities, including requests from persons with disabilities for accessible
- 726 crossing improvements at the location under study. These persons might not be adequately
- 727 reflected in the pedestrian volume count if the absence of a signal restrains their mobility.
- 728 E. The ~~posted or statutory~~ speed limit or the 85th-percentile speed on the uncontrolled
- 729 approaches to the location.

730 18 The following data, which are desirable for a more precise understanding of the operation of

- 731 the intersection, may be obtained during the periods described in Item B of Paragraph 17:
- 732 A. Vehicle-hours of stopped time delay determined separately for each approach.
- 733 B. The number and distribution of acceptable gaps in vehicular traffic on the major street for
- 734 entrance from the minor street.
- 735 C. The ~~posted or statutory~~ speed limit or the 85th-percentile speed on controlled approaches at a
- 736 point near to the intersection but unaffected by the control.
- 737 D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average
- 738 weekday or like periods of a Saturday or Sunday.
- 739 E. Queue length on stop-controlled approaches.

740 **Section 4C.02 Warrant 1, Eight-Hour Vehicular Volume**

741 Option:

742 05 If the ~~posted or statutory~~ speed limit or the 85th-percentile speed on the major street exceeds

743 40 mph, or if the intersection lies within the built-up area of an isolated community having a

744 population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may

745 be used in place of the 100 percent columns.

746 Option:

747 08 If the ~~posted or statutory~~ speed limit or the 85th-percentile speed on the major street exceeds

748 40 mph, or if the intersection lies within the built-up area of an isolated community having a

749 population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may

750 be used in place of the 80 percent columns.

754  
755

**Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume**

<b>Condition A—Minimum Vehicular Volume</b>									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	56% <sup>d</sup>	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	56% <sup>d</sup>
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112
<b>Condition B—Interruption of Continuous Traffic</b>									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	56% <sup>d</sup>	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	56% <sup>d</sup>
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

Footnote:

- a. Basic minimum hourly volume
- b. Used for combination of Conditions A and B after adequate trial of other remedial measures
- c. May be used when the major-street speed [limit or 85th-percentile speed](#) exceeds 40 mph or in an isolated community with a population of less than 10,000
- d. May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed [limit or 85th-percentile speed](#) exceeds 40 mph or in an isolated community with a population of less than 10,000

756

757 **Section 4C.03 Warrant 2, Four-Hour Vehicular Volume**

758 Option:

759 <sup>03</sup> If the ~~posted or statutory~~ speed limit or the 85th-percentile speed on the major street exceeds  
760 40 mph, or if the intersection lies within the built-up area of an isolated community having a  
761 population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.

762

763 **Section 4C.04 Warrant 3, Peak Hour**

764 Option:

765 <sup>04</sup> If the ~~posted or statutory~~ speed limit or the 85th-percentile speed on the major street exceeds  
766 40 mph, or if the intersection lies within the built-up area of an isolated community having a  
767 population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to evaluate the  
768 criteria in the second category of the Standard.

769

770

771 **Section 4C.05 Warrant 4, Pedestrian Volume**

772 Option:

773 03 If the ~~posted or statutory~~ speed limit or the 85th-percentile speed on the major street exceeds  
774 35 mph, or if the intersection lies within the built-up area of an isolated community having a  
775 population of less than 10,000, Figure 4C-6 may be used in place of Figure 4C-5 to evaluate  
776 Criterion A in Paragraph 2, and Figure 4C-8 may be used in place of Figure 4C-7 to evaluate  
777 Criterion B in Paragraph 2.

778  
779 **Section 4C.08 Warrant 7, Crash Experience**

780 Option:

781 03 If the ~~posted or statutory~~ speed limit or the 85th-percentile speed on the major street exceeds  
782 40 mph, or if the intersection lies within the built-up area of an isolated community having a  
783 population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may  
784 be used in place of the 80 percent columns.

785  
786 **CHAPTER 4D. TRAFFIC CONTROL SIGNAL FEATURES**

787  
788 **Section 4D.07 Size of Vehicular Signal Indications**

789 Option:

- 790 03 Eight-inch circular signal indications may be used in new signal faces only for:
- 791 A. The green or flashing yellow signal indications in an emergency-vehicle traffic control  
792 signal (see Section 4G.02);
  - 793 B. The circular indications in signal faces controlling the approach to the downstream  
794 location where two adjacent signalized locations are close to each other and it is not  
795 practical because of factors such as high approach speeds, horizontal or vertical curves,  
796 or other geometric factors to install visibility-limited signal faces for the downstream  
797 approach;
  - 798 C. The circular indications in a signal face that is located less than 120 feet from the stop  
799 line on a roadway with a ~~posted or statutory~~ speed limit or 85th-percentile speed (or  
800 operating speed on site roadways open to public travel) of 30 mph or ~~less~~ lower,  
801 **[Approved 6/09/16, 15A-EC-01]**

802  
803 **Section 4D.11 Number of Signal Faces on an Approach**

804 *Guidance:*

- 805 07 *If the ~~posted or statutory~~ speed limit or the 85th-percentile speed on an approach to a*  
806 *signalized location is 45 mph or higher , signal faces should be provided as follows for all new*  
807 *or reconstructed signal installations (see Figure 4D-3):*
- 808 08 *This layout of signal faces should also be considered for any major urban or suburban*  
809 *arterial street with four or more lanes and for other approaches with speeds of ~~less than~~ 45 mph*  
810 *or lower.*

811  
812 **[Rename Figure 4D-3]**

813 **Figure 4D-3. Recommended Vehicular Signal Faces for Approaches with ~~Posted, Statutory,~~**  
814 **Speed Limit or 85th-Percentile Speed of 45 mph or Higher**

815  
816

817 [Rename Table 4D-1]

818 **Table 4D-1. Recommended Minimum Number of Primary Signal Faces for Through**  
819 **Traffic on Approaches with ~~Posted, Statutory,~~ Speed Limit or 85th-Percentile Speed of 45**  
820 **mph or Higher**

821  
822

**Table 4D-2. Minimum Sight Distance for Signal Visibility**

<u>Speed Limit or 85th-Percentile-Speed</u>	<b>Minimum Sight Distance</b>
20 mph	175 feet
25 mph	215 feet
30 mph	270 feet
35 mph	325 feet
40 mph	390 feet
45 mph	460 feet
50 mph	540 feet
55 mph	625 feet
60 mph	715 feet

823 Note: Distances in this table are derived from stopping sight distance plus an  
824 assumed queue length for shorter cycle lengths (60 to 75 seconds).

825

826 **Section 4D.12 Visibility, Aiming and Shielding of Signal Faces**

827 *Guidance:*

828 <sup>18</sup> *If the ~~posted or statutory~~-speed limit or the 85th-percentile speed on an approach to a*  
829 *signalized location is 45 mph or higher, signal backplates should be used on all of the signal*  
830 *faces that face the approach. Signal backplates should also be considered for use on signal faces*  
831 *on approaches with ~~posted or statutory~~-speed limits or 85th-percentile speeds of ~~less than~~ 45*  
832 *mph or lower, where sun glare, bright sky, and/or complex or confusing backgrounds indicate a*  
833 *need for enhanced signal face target value.*

834

835 **Section 4D.13 Lateral Positioning of Signal Faces**

836 Support:

837 <sup>06</sup> Section 4D.11 contains additional provisions regarding lateral positioning of signal faces for  
838 approaches having a ~~posted or statutory~~-speed limit or ~~an~~ 85th-percentile speed of 45 mph or  
839 higher.

840

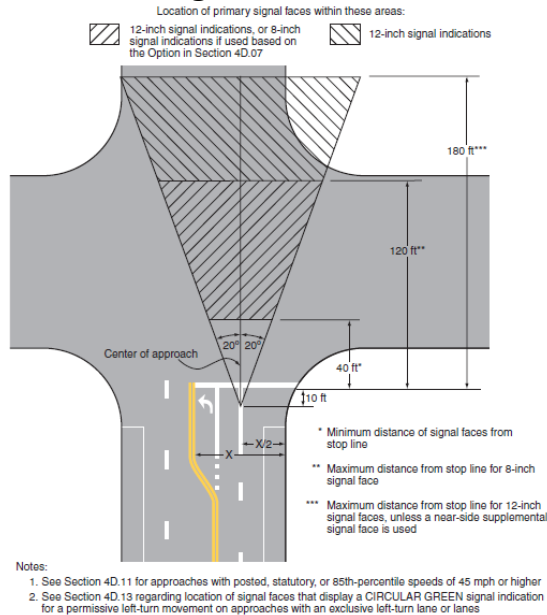
841 **Section 4D.14 Longitudinal Positioning of Signal Faces**

842 Support:

843 <sup>02</sup> Section 4D.11 contains additional provisions regarding lateral positioning of signal faces for  
844 approaches having a ~~posted~~-speed limit or 85th-percentile speed of 45 mph or higher.

845

Figure 4D-4. Lateral and Longitudinal Location of Primary Signal Faces



847  
848  
849

**[Revise Figure 4D-4 notes]**

Notes:

850  
851  
852  
853  
854

1. See Section 4D.11 for approaches with ~~posted, statutory,~~ speed limits or 85th-percentile speeds of 45 mph or higher.
2. See Section 4D.13 regarding location of signal faces that display a CIRCULAR GREEN signal indication for a permissive left-turn movement on approaches with an exclusive left-turn lane or lanes

855  
856  
857  
858

**Section ~~4D.25~~ 4F.16 Signal Indications for Approaches ~~W~~with Shared Left Turn/Right Turn Lanes and from which there are No Through Movements Permitted**

**Standard:**

**xx CIRCULAR YELLOW and CIRCULAR GREEN indications shall not be exhibited in any signal face controlling an approach with no through movement if when:**

863  
864  
865  
866  
867  
868  
869  
870

- A. The approach has a ~~posted or statutory~~ speed limit or 85th-percentile speed on the approach is ~~of 35 mph or greater, or higher, or~~**
- B. ~~An opposing roadway exists that~~ The one-way roadway that opposes the approach is an exit ramp from a freeway or expressway-controlled access roadway, or**
- C. ~~An opposing one-way roadway exists that~~ The one-way roadway that opposes the approach has a ~~posted or statutory~~ speed limit of 35 mph or ~~greater higher.~~** [Approved 6/22/2012, 11B-STC-01 and revised 6/28/2014, 14A-STC-01]

871  
872  
873

**Section ~~4F.01~~ 4K.01 Application of Pedestrian Hybrid Beacons**

Guidance:

874  
875

06 For a major street where the ~~posted or statutory~~ speed limit or the 85th-percentile speed is 35 mph or ~~less~~ lower the need for a pedestrian hybrid beacon should be considered if the



876 engineering study finds that the plotted point representing the vehicles per hour on the major  
877 street (total of both approaches) and the corresponding total of all pedestrians crossing the  
878 major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above  
879 the applicable curve in Figure 4F-1 for the length of the crosswalk.

880 07 For a major street where the ~~posted or statutory~~-speed limit or the 85th-percentile speed  
881 exceeds 35 mph , the need for a pedestrian hybrid beacon should be considered if the  
882 engineering study finds that the plotted point representing the vehicles per hour on the major  
883 street (total of both approaches) and the corresponding total of all pedestrians crossing the  
884 major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above  
885 the applicable curve in Figure 4F-2 for the length of the crosswalk.

886 08 For crosswalks that have lengths other than the four that are specifically shown in Figures  
887 4F-1 and 4F-2, the values should be interpolated between the curves.

888

### 889 **Section 4F.02-4K.02 Design of Pedestrian Hybrid Beacons**

890 *Guidance:*

891 05 On approaches having ~~posted or statutory~~-speed limits or 85th-percentile speeds in excess of  
892 35 mph and on approaches having traffic or operating conditions that would tend to obscure  
893 visibility of roadside hybrid beacon face locations, both of the minimum of two pedestrian hybrid  
894 beacon faces should be installed over the roadway.

895 06 On multi-lane approaches having a ~~posted or statutory~~-speed limits or 85th-percentile  
896 speeds of 35 mph or ~~less~~ lower, either a pedestrian hybrid beacon face should be installed on  
897 each side of the approach (if a median of sufficient width exists) or at least one of the pedestrian  
898 hybrid beacon faces should be installed over the roadway.

899

## 900 **CHAPTER 4G. TRAFFIC CONTROL SIGNALS AND HYBRID BEACONS FOR** 901 **EMERGENCY-VEHICLE ACCESS**

902

### 903 **Section 4G.01 Application of Emergency-Vehicle Traffic Control Signals and Hybrid** 904 **Beacons**

905 *Guidance:*

906 05 The sight distance determination should be based on the location of the visibility obstruction  
907 for the critical approach lane for each street or drive and the ~~posted or statutory~~-speed limit or  
908 85th-percentile speed on the major street, whichever is higher.

909

### 910 **Section 4G.04 Emergency-Vehicle Hybrid Beacons**

911 *Guidance:*

912 15 On approaches having ~~posted or statutory~~-speed limits or 85th-percentile speeds in excess of  
913 40 mph and on approaches having traffic or operating conditions that would tend to obscure  
914 visibility of roadside beacon faces, both of the minimum of two emergency-vehicle hybrid beacon  
915 faces should be installed over the roadway.

916 16 On multi-lane approaches having ~~posted or statutory~~-speed limits or 85th-percentile speeds  
917 of 40 mph or ~~less~~ lower, either an emergency-vehicle hybrid beacon face should be installed on  
918 each side of the approach (if a median of sufficient width exists) or at least one of the  
919 emergency-vehicle hybrid beacon faces should be installed over the roadway.

920

921

922 **Section ~~4L.02~~ 4S.02 Intersection Control Beacon**

923 *Guidance:*

924 ~~xx~~ Twelve-inch signal indications should be used for Intersection Control Beacons facing  
925 approaches where:

926 A. The ~~posted or statutory~~ speed limit or the 85th-percentile approach speed is ~~higher than~~  
927 40 mph or higher;

928 B. Where only post-mounted flashing beacon signal faces are used. [Approved 6/24/2014,  
929 14A-STC-02]

930

931 **PART 5 – TRAFFIC CONTROL DEVICES FOR LOW-VOLUME ROADS**

932 [This Chapter has been merged into the other Parts of the MUTCD by action of the Council  
933 (01/10/2014, 13B-RW-01) so none of the text would be applicable for consideration.]

934

935 **PART 6 – TEMPORARY TRAFFIC CONTROL**

936

937 **CHAPTER 6C. TEMPORARY TRAFFIC CONTROL ELEMENTS**

938

939 **Table 6C-4. Formulas for Determining Taper Length**

Speed (S)	Taper Length (L) in feet
40 mph or <del>less</del> <u>lower</u>	$L = WS^2/60$
45 mph or <del>more</del> <u>higher</u>	$L = WS$

Where: L = taper length in feet  
W = width of offset in feet  
S = ~~posted~~ speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

940

941 **CHAPTER 6F. TEMPORARY TRAFFIC CONTROL ZONE DEVICES**

942

943 **Section 6F.02 General Characteristics of Signs**

944 **Standard:**

945 09 Except as provided in Section 2A.11, the sizes for TTC signs and plaques shall be as  
946 shown in Table 6F-1. The sizes in the minimum column shall only be used on low-volume  
947 rural roads, local streets or roadways where the ~~85th-percentile operating speed or posted~~  
948 ~~speed limit is less than 35 mph~~ 30 mph or lower. [Approved 1/10/2014, 13B-RW-01]

949

950 **Section 6F.17 Position of Advance Warning Signs**

951 *Guidance:*

952 01 Where highway conditions permit, warning signs should be placed in advance of the TTC  
953 zone at varying distances depending on roadway type, condition, and posted speed. Table 6C-1  
954 contains information regarding the spacing of advance warning signs. Where a series of two or  
955 more advance warning signs is used, the closest sign to the TTC zone should be placed  
956 approximately 100 feet for low-speed urban ~~streets~~ roads to 1,000 feet or more for freeways and  
957 expressways.

958

959

960

961 **Section 6F.48 Reverse Curve Signs (W1-4 Series)**

962 *Guidance:*

963 01 *In order to give road users advance notice of a lane shift, a Reverse Curve (W1-4, W1-4b, or*  
964 *W1-4c) sign (see Figure 6F-4) should be used when a lane (or lanes) is being shifted to the left*  
965 *or right. If the design speed of the curves is 30 mph or ~~less~~ lower, a Reverse Turn (W1-3) sign*  
966 *should be used.*

967  
968 **Section 6F.49 Double Reverse Curve Signs (W24-1 Series)**

969 Option:

970 01 The Double Reverse Curve (W24-1, W24-1a, or W24-1b) sign (see Figure 6F-4) may be  
971 used where the tangent distance between two reverse curves is less than 600 feet, thus making it  
972 difficult for a second Reverse Curve (W1-4 series) sign to be placed between the curves. If the  
973 design speed of the curves is 30 mph or ~~less~~ lower, Double Reverse Turn signs should be used.

974  
975 **Section 6F.52 Advisory Speed Plaque (W13-1P)**

976 Option:

977 01 In combination with a warning sign, an Advisory Speed (W13-1P) plaque (see Figure 6F-4)  
978 may be used to indicate ~~a recommended~~ an advisory speed through the TTC zone.

979 **Standard:**

980 02 **The Advisory Speed plaque shall not be used in conjunction with any sign other than a**  
981 **warning sign, nor shall it be used alone. When used with orange TTC zone signs, this**  
982 **plaque shall have a black legend and border on an orange background. The sign shall be at**  
983 **least 24 x 24 inches in size when used with a sign that is 36 x 36 inches or larger. Except in**  
984 **emergencies, an Advisory Speed plaque shall not be mounted until the ~~recommended~~**  
985 **advisory speed is determined by the highway agency.**

986  
987 **Section 6F.60 Portable Changeable Message Signs**

988 Option:

989 15 For portable changeable message signs mounted on service patrol trucks or other incident  
990 response vehicles, a letter height as short as 10 inches may be used. Shorter letter sizes may also  
991 be used on a portable changeable message sign used on low speed ~~facilities~~ roads provided that  
992 the message is legible from at least 650 feet.

993  
994 **Section 6F.61 Arrow Boards**

995 Support:

996 06 Type A arrow boards are appropriate for use on low-speed urban ~~streets~~ roads. Type B  
997 arrow boards are appropriate for intermediate-speed ~~facilities~~ roads and for maintenance or  
998 mobile operations on high-speed ~~roadways~~ highways. Type C arrow boards are intended to be  
999 used on high-speed, high-volume motor vehicle traffic control projects. Type D arrow boards are  
1000 intended for use on vehicles authorized by the State or local agency.

1001

1002 **Section 6F.68 Type 1, 2, or 3 Barricades**

1003 **Standard:**

1004 05 **The minimum length for Type 1 and Type 2 Barricades shall be 24 inches, and the**  
1005 **minimum length for Type 3 Barricades shall be 48 inches. Each barricade rail shall be 8 to**  
1006 **12 inches wide. Barricades used on freeways, expressways, and other high-speed ~~roadways~~**

1007 **highways** shall have a minimum of 270 square inches of retroreflective area facing road  
1008 users.

1009  
1010 *Guidance:*

1011 13 On high-speed **freeways and** expressways or in other situations where barricades may be  
1012 susceptible to overturning in the wind, ballasting should be used.

1013  
1014 *Guidance:*

1015 18 Type 2 or Type 3 Barricades should be used on freeways and expressways or other high-  
1016 speed ~~roadways~~ **highways**. Type 3 Barricades should be used to close or partially close a road.

### 1017 **Section 6F.70 Temporary Traffic Barriers as Channelizing Devices**

1018 *Guidance:*

1019 04 Temporary traffic barriers should not be used for a merging taper except in low-speed  
1020 urban ~~areas~~ **roads**.

1021 05 When it is necessary to use a temporary traffic barrier for a merging taper in low-speed  
1022 urban ~~areas~~ **roads** or for a constricted/restricted TTC zone, the taper length should be designed  
1023 to optimize road user operations considering the available geometric conditions.

1024 **Standard:**

1025 06 **When it is necessary to use a temporary traffic barrier for a merging taper in low-  
1026 speed urban ~~areas~~ **roads** or for a constricted/restricted TTC zone, the taper shall be  
1027 delineated.**

1028

## 1029 **CHAPTER 6G. TYPE OF TEMPORARY TRAFFIC CONTROL ZONE ACTIVITIES**

1030

### 1031 **Section 6G.07 Work on the Shoulder with No Encroachment**

1032 *Guidance:*

1033 04 When an improved shoulder is closed on a high-speed ~~roadway~~ **highway** it should be treated  
1034 as a closure of a portion of the road system because road users expect to be able to use it in  
1035 emergencies. Road users should be given ample advance warning that shoulders are closed for  
1036 use as refuge areas throughout a specified length of the approaching TTC zone. The sign(s)  
1037 should read SHOULDER CLOSED (W21-5a) with distances indicated. The work space on the  
1038 shoulder should be closed off by a taper or channelizing devices with a length of 1/3 L using the  
1039 formulas in Tables 6C-3 and 6C-4.

1040

### 1041 **Section 6G.08 Work on the Shoulder with Minor Encroachment**

1042 *Option:*

1043 04 A lane width of 9 feet may be used for short-term stationary work on low-volume, low-  
1044 speed ~~roadways~~ **roads** when vehicular traffic does not include longer and wider heavy  
1045 commercial vehicles.

1046

### 1047 **Section 6G.12 Work Within the Traveled Way of a Multi-Lane, Non-Access Controlled 1048 Highway**

1049 *Option:*

1050 13 If operating speeds are 40 mph or ~~less~~ **lower** and the space approaching the work area does  
1051 not permit moving traffic over one lane at a time, a single continuous taper may be used.

1052

1053 **Section 6G.13 Work Within the Traveled Way at an Intersection**

1054 *Guidance:*

1055 06 *For work at an intersection, advance warning signs, devices, and markings should be used*  
1056 *on all cross streets, as appropriate. The typical applications depict urban intersections on*  
1057 *arterial streets. Where the posted speed limit, the off-peak 85th-percentile speed prior to the*  
1058 *work starting, or the anticipated operating speed ~~exceeds 40 mph~~ is 45 mph or higher, additional*  
1059 *warning signs should be used in the advance warning area.*

1061 **Section 6G.14 Work Within the Traveled Way of a Freeway or Expressway**

1062 Support:

1063 01 Problems of TTC might occur under the special conditions encountered where vehicular  
1064 traffic must be moved through or around TTC zones on high-speed, high-volume ~~roadways~~  
1065 highways. Although the general principles outlined in the previous Sections of this Manual are  
1066 applicable to all types of highways, high-speed, access controlled highways need special  
1067 attention in order to accommodate vehicular traffic while also protecting road users and workers.  
1068 The road user volumes, road vehicle mix (buses, trucks, cars, and bicycles, if permitted), and  
1069 speed of vehicles on these facilities require that careful TTC procedures be implemented, for  
1070 example, to induce critical merging maneuvers well in advance of work spaces and in a manner  
1071 that creates minimum turbulence and delay in the vehicular traffic stream. These situations often  
1072 require more conspicuous devices than specified for normal rural highway or urban street use.  
1073 However, the same important basic considerations of uniformity and standardization of general  
1074 principles apply for all roadways.

1075  
1076 **CHAPTER 6H. TYPICAL APPLICATIONS**

1077  
1078 **Table 6H-4. Formulas for Determining Taper Length**

Speed (S)	Taper Length (L) in feet
40 mph or <del>less</del> <u>lower</u>	$L = WS^2/60$
45 mph or <del>more</del> <u>higher</u>	$L = WS$

Where: L = taper length in feet  
W = width of offset in feet  
S = ~~posted~~ speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

1079  
1080 **Notes for Figure 6H-7—Typical Application 7**  
1081 **Road Closure with a Diversion**

1082 *Guidance:*

- 1083 6. *When the tangent section of the diversion is more than 600 feet, and the diversion has*  
1084 *sharp curves with ~~recommended~~ advisory speeds of 30 mph or ~~less~~ lower. Reverse Turn*  
1085 *signs should be used.*  
1086

1087 **Notes for Figure 6H-15—Typical Application 15**  
1088 **Work in the Center of a Road with Low Traffic Volumes**

1089 Option:

- 1090 4. A lane width of 9 feet may be used for short-term stationary work on low-volume, low-  
1091 speed ~~roadways~~ roads when motor vehicle traffic does not include longer and wider  
1092 heavy commercial vehicles.

1093  
1094 **Notes for Figure 6H-18—Typical Application 18**  
1095 **Lane Closure on a Minor Street**

1096 **Standard:**

- 1097 1. This TTC shall be used only for low-speed ~~facilities~~ roads having low traffic  
1098 volumes.

1099  
1100 **Notes for Figure 6H-26—Typical Application 26**  
1101 **Closure in the Center of an Intersection**

1102 Option:

- 1103 3. For short-term use on low-volume, low-speed ~~roadways~~ roads with vehicular traffic that  
1104 does not include longer and wider heavy commercial vehicles, a minimum lane width of  
1105 9 feet may be used.

1106  
1107 **Notes for Figure 6H-30—Typical Application 30**  
1108 **Interior Lane Closure on a Multi-Lane Street**

1109 *Guidance:*

- 1110 1. *This information applies to low-speed, low-volume urban ~~streets~~ roads. Where speed or*  
1111 *volume is higher, additional signing such as LEFT LANE CLOSED XX FT should be*  
1112 *used between the signs shown.*

1113  
1114 **Notes for Figure 6H-31—Typical Application 31**  
1115 **Lane Closure on a Street with Uneven Directional Volumes**

1116 *Guidance:*

- 1117 5. *If the lane shift has curves with ~~recommended~~ advisory speeds of 30 mph or ~~less~~ lower,*  
1118 *Reverse Turn signs should be used.*

1119  
1120 **Notes for Figure 6H-35—Typical Application 35**  
1121 **Mobile Operation on a Multi-Lane Road**

1122 Option:

- 1123 13 On high-speed ~~roadways~~ highways, a third shadow vehicle (not shown) may be used with  
1124 Shadow Vehicle 1 in the closed lane, Shadow Vehicle 2 straddling the edge line, and  
1125 Shadow Vehicle 3 on the shoulder.

1127 PART 7 -- TRAFFIC CONTROLS FOR SCHOOL AREAS

1128  
1129 CHAPTER 7B. SIGNS

1130  
1131 Section 7B.01 Size of School Signs

1132 Standard:

1133 03 The sizes in the Minimum column shall be used only on low-volume rural roads,  
1134 special purpose roads or where traffic volumes are low and operating speeds are 30 mph or  
1135 less lower ~~as determined by engineering judgment.~~ [Approved 1/10/2014, 13B-RW-01]  
1136

1137 PART 8 – TRAFFIC CONTROL FOR RAILROAD AND LIGHT  
1138 RAIL TRANSIT GRADE CROSSINGS

1139  
1140 CHAPTER 8B. SIGNS AND MARKINGS

1141  
1142 Section 8B.06 Grade Crossing Advance Warning Signs (W10 Series)

1143 Standard:

1144 01 A ~~Highway-Rail~~ Grade Crossing Advance Warning (W10-1) sign (see Figure 8B-4)  
1145 shall be used on each highway in advance of every highway-rail grade crossing ~~and every~~  
1146 ~~highway-LRT grade crossing in semi-exclusive alignments,~~ except in the following  
1147 circumstances: [Approved 1/21/2011, 10B-RR-03]

- 1148 A. On an approach to a grade crossing from a T-intersection with a parallel highway if the  
1149 distance from the edge of the track to the edge of the parallel roadway is less than 100  
1150 feet and W10-3 signs are used on both approaches of the parallel highway;
- 1151 B. On low-volume, low-speed highways-roads crossing minor spurs or other tracks that  
1152 are infrequently used and road users are directed by an authorized person on the  
1153 ground to not enter the crossing at all times that approaching rail traffic is about to  
1154 occupy the crossing;
- 1155 C. In business or commercial areas where active grade crossing traffic control devices are  
1156 in use; or
- 1157 D. Where physical conditions do not permit even a partially effective display of the sign

1158  
1159 Section 8B.27 Pavement Markings

1160 Standard:

1161 02 Identical markings shall be placed in each approach lane on all paved approaches to  
1162 grade crossings where signals or automatic gates are located, and at all other grade  
1163 crossings where the ~~posted or statutory~~ highway speed is 40 mph or ~~greater~~ higher.  
1164

1165 04 Pavement markings shall not be required at grade crossings where the ~~posted or~~  
1166 ~~statutory~~ highway speed is ~~less than 40 mph~~ 35 mph or lower if an engineering study  
1167 indicates that other installed devices provide suitable warning and control. Pavement  
1168 markings shall not be required at grade crossings in urban areas if an engineering study  
1169 indicates that other installed devices provide suitable warning and control.  
1170

1171 CHAPTER 8C. FLASHING-LIGHT SIGNALS, GATES, AND TRAFFIC CONTROL  
1172 SIGNALS

1173 **Section 8C.01 Introduction**

1174 Support:

1175 15 LRT typically operates through grade crossings in semi-exclusive and mixed-use alignments  
1176 at speeds between 10 and 65 mph.

1177 16 When LRT speed is cited in this Part, it refers to the maximum speed at which LRT  
1178 equipment is permitted to traverse a particular grade crossing.

1180 **Section 8C.05 Use of Active Devices at Highway-LRT Grade Crossings**

1181 Guidance:

1182 03 At highway-LRT grade crossings where LRT ~~operating speeds are 25 mph or less~~ lower,  
1183 active devices should be used unless an engineering study indicates that the use of Crossbuck  
1184 Assemblies, STOP signs alone, or YIELD signs alone would be adequate.

1185 **Standard:**

1186 04 At highway-LRT grade crossings where LRT ~~operating speeds exceed 25 mph~~ are 30  
1187 mph or higher, active devices shall be used.

1188 05 At highway-LRT grade crossings where LRT ~~operating speeds exceed 40 mph~~ are 45  
1189 mph or higher, automatic gates shall be used.

1190 Guidance:

1191 06 Traffic control signals alone should not be used where the LRT grade crossing is at a  
1192 location other than an intersection and LRT ~~operating speeds exceed 20 mph~~ are 25 mph or  
1193 higher. [Approved 1/11/2013, 12B-RR-01]

1195 **Section 8C.09 Traffic Control Signals at or Near Highway-Rail Grade Crossings**

1196 Option:

1197 02 Traffic control signals may be used instead of flashing-light signals to control road users at  
1198 industrial highway-rail grade crossings and other places where the maximum speed of trains is  
1199 10 mph or less lower. [Approved 6/28/2014, 13B-RR-01]

1201 **Section 8C.10 Traffic Control Signals at or Near Highway-LRT Grade Crossings**

1202 Option:

1203 10 At a location other than an intersection, when LRT speeds are ~~less than 25 mph~~ or lower,  
1204 traffic control signals alone may be used to control road users at highway-LRT grade crossings  
1205 only when justified by an engineering study.

1207 **Section 8C.13 Pedestrian and Bicycle Signals and Crossings at LRT Grade Crossings**

1208 Guidance:

1209 03 *Flashing-light signals (see Figure 8C-4) with a Crossbuck (R15-1) sign and an audible*  
1210 *device should be installed at pedestrian and bicycle crossings where an engineering study has*  
1211 *determined that the sight distance is not sufficient for pedestrians and bicyclists to complete their*  
1212 *crossing prior to the arrival of the LRT traffic at the crossing, or where LRT speeds ~~exceed~~ are*  
1213 *40 ~~35~~ mph or higher.*



1215 **Section 8C.150 Traffic Control Signals at or Near Highway-LRT Grade Crossings**

1216 [Approved 6/28/2014, 13B-RR-01]

1217 10 At a location other than an intersection, when LRT speeds are ~~less than 25 mph~~ 25 mph or  
1218 lower, traffic control signals alone may be used to control road users at highway-LRT grade  
1219 crossings only when justified by a Diagnostic Team. Typical circumstances may include:

- 1220 A. Geometric conditions preclude the installation of highway-LRT grade crossing warning  
1221 devices.  
1222 B. LRT vehicles share the same roadway with road users.  
1223 C. Traffic control signals already exist.

1224

1225 **PART 9 – TRAFFIC CONTROL FOR BICYCLE FACILITIES**

1226

1227 **CHAPTER 9B. SIGNS**

1228

1229 **Section 9B.04 Bike Lane Signs and Plaques (R3-17, R3-17aP, R3-17bP)**

1230 *Guidance:*

1231 02 *If used, Bike Lane signs and plaques should be used in advance of the upstream end of the*  
1232 *bicycle lane, at the downstream end of the bicycle lane, and at periodic intervals along the*  
1233 *bicycle lane as determined by engineering judgment based on ~~prevailing~~ the operating speed of*  
1234 *bicycle and other traffic, block length, distances from adjacent intersections, and other*  
1235 *considerations.*

1236

1237 **CHAPTER 9C. MARKINGS**

1238

1239 **Section 9C.07 Shared Lane Marking**

1240 *Guidance:*

1241 02 *The Shared Lane Marking should not be placed on roadways that have a speed limit ~~above~~*  
1242 *~~35 mph of 40 mph or greater~~ more higher.* [Approved 6/30/2017, 17A-BIK-02]