



National Committee on Uniform Traffic Control Devices

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1
2 **National Committee on Uniform Traffic Control Devices (NCUTCD)**
3 **Recommended Changes to Proposed Text for 11th Edition of the MUTCD**
4 **Docket Number: FHWA-2020-0001**

5
6 **Federal Register Item Number:** 321-345

7 **NPA MUTCD Section Number:** Sections 3B.01-3B.31

8 **Legend:** Base text shown in proposal is the NPA “clean” proposed text.

- 9 • NCUTCD recommendation for text to be added in final rule.
- 10 • ~~NCUTCD recommendation for text to be deleted in final rule.~~
- 11 • NCUTCD recommendation for text to be moved/relocated in final rule.
- 12 • NPA text that was not previously approved by NCUTCD but is now approved.
- 13 • Explanatory note: [Note that explains purpose of recommended change.]

14
15 The following pages present NCUTCD recommendations for changes to the MUTCD NPA
16 proposed text, tables, and figures for Chapter 3B. Below is a short summary of the NCUTCD
17 position for each section of this chapter. A more detailed summary is provided at the beginning
18 of each section.

- 19 • NPA #321, Section 3B.01: NCUTCD agrees with NPA content (no changes recommended).
- 20 • NPA #322, Section 3B.02: NCUTCD agrees with NPA content (no changes recommended)
- 21 • NPA #323, Section 3B.03: NCUTCD agrees with NPA content (no changes recommended).
- 22 • NPA #324, Section 3B.04: NCUTCD agrees with NPA content (no changes recommended).
- 23 • NPA #325, Section 3B.05: Changes recommended based on Council action in spring 2021.
- 24 • NPA #326, Section 3B.06: NCUTCD agrees with NPA content (no changes recommended).
- 25 • NPA #327, Section 3B.07: Changes recommended based on Council action in spring 2021.
- 26 • NPA #328, Section 3B.08: Changes recommended based on Council action in spring 2021.
- 27 • NPA #329, Section 3B.09: Changes recommended based on Council action in spring 2021.
- 28 • Section 3B.10: NCUTCD agrees with NPA content (no changes recommended).
- 29 • NPA #330, Section 3B.11: Changes recommended based on Council action in spring 2021.
- 30 • NPA #331, Section 3B.12: Changes recommended based on Council action in spring 2021.
- 31 • NPA #332, Section 3B.13: NCUTCD agrees with NPA content (no changes recommended).
- 32 • Section 3B.14: NCUTCD agrees with NPA content (no changes recommended).
- 33 • Section 3B.15: NCUTCD agrees with NPA content (no changes recommended).
- 34 • Section 3B.16: NCUTCD agrees with NPA content (no changes recommended).
- 35 • NPA #333, Section 3B.17: NCUTCD agrees with NPA content (no changes recommended).
- 36 • NPA #335, Section 3B.18: NCUTCD agrees with NPA content (no changes recommended).
- 37 • NPA #336, Section 3B.19: NCUTCD agrees with NPA content (no changes recommended).
- 38 • NPA #337, Section 3B.20: Changes recommended based on Council action in spring 2021.
- 39 • NPA #338, Section 3B.21: NCUTCD agrees with NPA content (no changes recommended).
- 40 • NPA #339, Section 3B.22: NCUTCD agrees with NPA content (no changes recommended).
- 41 • Section 3B.23: NCUTCD agrees with NPA content (no changes recommended).

- 43 • Section 3B.24: NCUTCD agrees with NPA content (no changes recommended).
44 • NPA #340, Section 3B.25: Changes recommended based on Council action in spring 2021.
45 • Section 3B.26: NCUTCD agrees with NPA content (no changes recommended).
46 • NPA #341, Section 3B.27: NCUTCD agrees with NPA content (no changes recommended).
47 • NPA #343, Section 3B.28: NCUTCD agrees with NPA content (no changes recommended).
48 • NPA #344, Section 3B.29: Changes recommended based on Council action in spring 2021.
49 • Section 3B.30: NCUTCD agrees with NPA content (no changes recommended).
50 • NPA #345, Section 3B.31: Changes recommended based on Council action in spring 2021.
51

CHAPTER 3B. PAVEMENT AND CURB MARKINGS

56 **Section 3B.01 Comments:** NCUTCD agrees with 3B.1 as presented in the NPA.

58 **Section 3B.01 Yellow Center Line Pavement Markings**

59 **Standard:**

60 **Center line pavement markings, when used, shall be the pavement markings used to**
61 **delineate the separation of traffic lanes that have opposite directions of travel on a roadway**
62 **and shall be yellow.**

63 **Option:**

64 Center line pavement markings may be placed at a location that is not the geometric center of
65 the roadway.

66 On roadways without continuous center line pavement markings, short sections may be
67 marked with center line pavement markings to control the position of traffic at specific locations,
68 such as around curves, over hills, on approaches to grade crossings, at grade crossings, and at
69 bridges.

70 **Standard:**

71 **The center line markings on two-lane, two-way roadways shall be one of the following as**
72 **shown in Figure 3B-1:**

73 **A. Two-direction passing zone markings consisting of a normal width broken yellow**
74 **line where crossing the center line markings for passing with care is permitted for traffic**
75 **traveling in either direction;**

76 **B. One-direction no-passing zone markings consisting of a double yellow line, one of**
77 **which is a normal width broken yellow line and the other is a normal width solid yellow line,**
78 **where crossing the center line markings for passing with care is permitted for the traffic**
79 **traveling adjacent to the broken line, but is prohibited for traffic traveling adjacent to the**
80 **solid line; or**

81 **C. Two-direction no-passing zone markings consisting of two normal width solid yellow**
82 **lines where crossing the center line markings for passing is prohibited for traffic traveling**
83 **in either direction.**

84 **A single solid yellow line shall not be used as a center line marking on a two-way roadway.**
85 **Except where a reversible lane (see Section 3B.04) or a two-way left-turn lane (see Section**
86 **3B.05) is present, the center line markings on undivided two-way roadways with four or**
87 **more lanes for moving motor vehicle traffic always available shall be the two-direction no-**
88 **passing zone markings consisting of normal width double solid yellow lines as shown in**
89 **Figure 3B-2.**

90 **Guidance:**

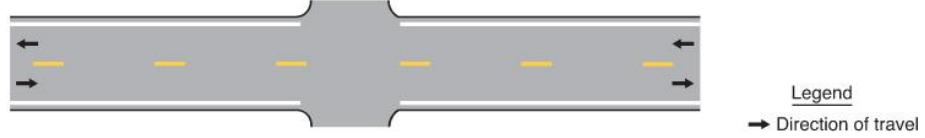
91 *On two-way roadways with three through lanes for moving motor vehicle traffic, two lanes*
92 *should be designated for traffic in one direction by using one- or two-direction no-passing zone*
93 *markings as shown in Figure 3B-3.*

95 **Figure 3B-1 Comments:** NCUTCD agrees with Figure 3B-1 as presented in the NPA.

96 **Figure 3B-1. Examples of Two-Lane, Two-Way Marking Applications**

Figure 3B-1. Yellow Center Lines for Two-Lane, Two-Way Applications

A - Two-lane, two-way marking with passing permitted in both directions



B - Two-lane, two-way marking with no-passing zones



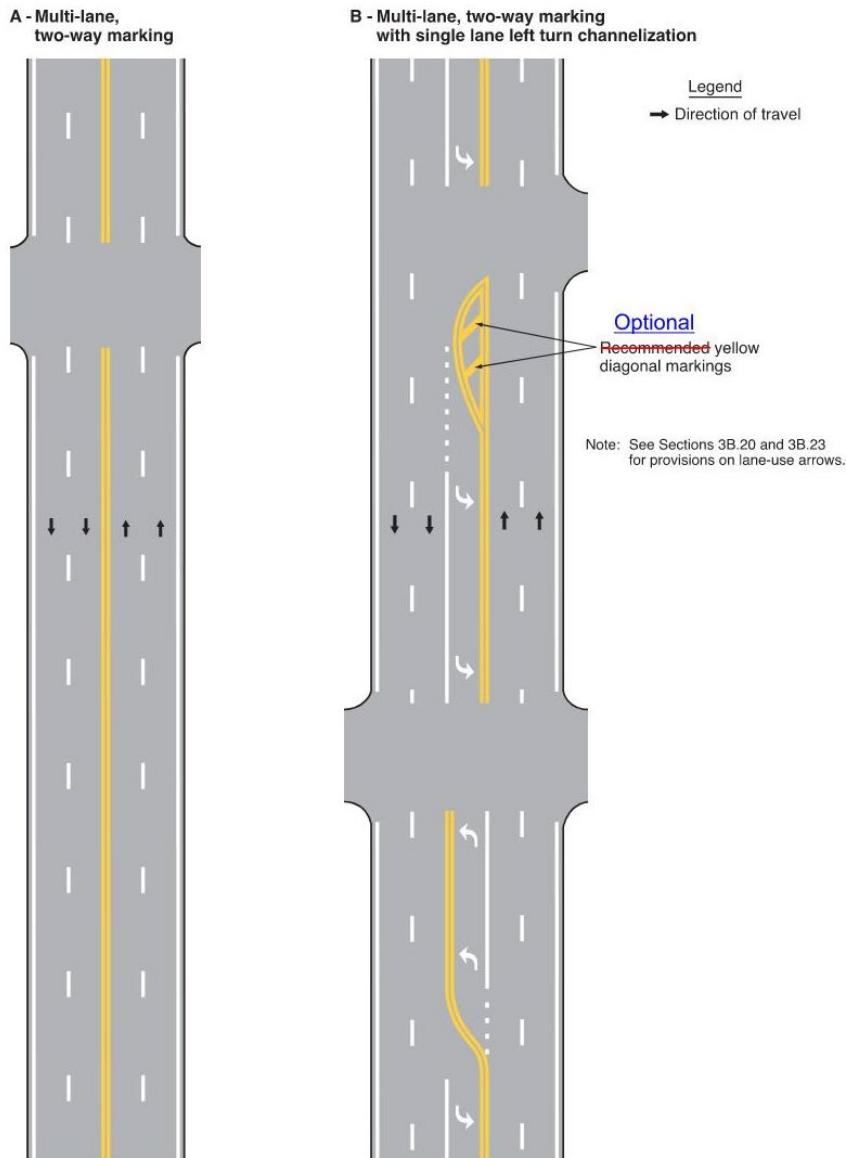
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99 **Figure 3B-2 Comments:** NCUTCD generally agrees with Figure 3B-2 as presented in the NPA,
100 but recommends changing diagonal markings from “recommended” to “optional” to be
101 consistent with NCUTCD recommendations to Section 3B.25.

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

Figure 3B-2. Yellow Center Lines for Four-or-More Lane, Two-Way Applications



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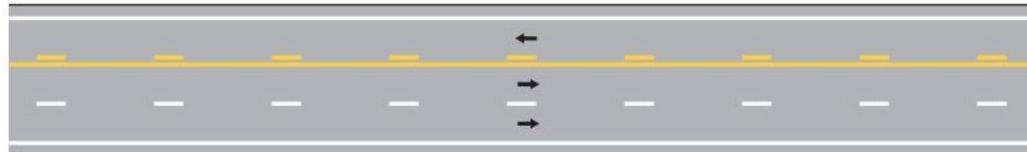
105 **Figure 3B-3 Comments:** NCUTCD agrees with Figure 3B-3 as presented in the NPA.

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

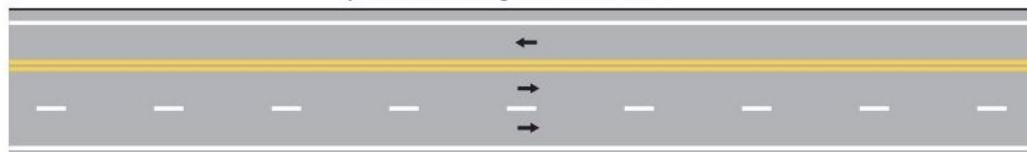
Figure 3B-3. Yellow Center Lines for Three-Lane, Two-Way Applications

A - Three-lane, two-way marking with passing
permitted in single-lane direction

Legend
→ Direction of travel



B - Three-lane, two-way marking with passing
prohibited in single-lane direction



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110 **Section 3B.02 Comments:** NCUTCD agrees with 3B.02 as presented in the NPA.

111

112 **Section 3B.02 Warrants for Yellow Center Lines**

113 **Standard:**

114 **Center line markings shall be placed on all paved urban arterials and collectors that**
115 **have a traveled way of 20 feet or more in width and an ADT of 6,000 vehicles per day or**
116 **greater. Center line markings shall also be placed on all paved two-way streets or**
117 **highways that have three or more lanes for moving motor vehicle traffic.**

118 **Guidance:**

119 *Center line markings should be placed on paved urban arterials and collectors that have a*
120 *traveled way of 20 feet or more in width and an ADT of 4,000 vehicles per day or greater.*
121 *Center line markings should also be placed on all rural arterials and collectors that have a*
122 *traveled way of 18 feet or more in width and an ADT of 3,000 vehicles per day or greater.*
123 *Center line markings should also be placed on other traveled ways where an engineering study*
124 *indicates such a need.*

125 *Engineering judgment should be used in determining whether to place center line markings on*
126 *traveled ways that are less than 16 feet wide because of the potential for traffic encroaching on*
127 *the pavement edges, traffic being affected by parked vehicles, and traffic encroaching into the*
128 *opposing traffic lane.*

129 **Option:**

130 *Center line markings may be placed on other paved two-way traveled ways that are 16 feet or*
131 *more in width.*

132 *If a traffic count is not available, the ADTs described in this Section may be estimates that*
133 *are based on engineering judgment.*

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137 **Section 3B.03 Comments:** NCUTCD agrees with 3B.03 as presented in the NPA.

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139 **Section 3B.03 No-Passing Zone Pavement Markings**

140 **Standard:**

141 **No-passing zones shall be marked by either the one direction no-passing zone pavement**
142 **markings or the two-direction no-passing zone pavement markings described in Section**
143 **3B.01 and shown in Figures 3B-1 and 3B-3.**

144 **No-passing zone markings shall be used on:**

- 145A. **Two-way roadways at lane-reduction transitions (see Section 3B.12),**
146B. **Approaches to obstructions that must be passed on the right (see Section 3B.13), and**
147C. **Approaches to grade crossings (see Section 8C.02).**

148 **On two-way, two- or three-lane roadways where center line markings are installed, no**
149 **passing zones shall be established at vertical and horizontal curves and other locations**
150 **where an engineering study indicates that passing must be prohibited because of**
151 **inadequate sight distances or other special conditions.**

152 **On roadways with center line markings, no-passing zone markings shall be used at**
153 **horizontal or vertical curves where the passing sight distance is less than the minimum**
154 **shown in Table 3B-1 for the 85th-percentile speed or the speed limit.**

155 **Support:**

156 The passing sight distance on a vertical curve is the distance at which an object 3.5 feet
157 above the pavement surface can be seen from a point 3.5 feet above the pavement (see Figure
158 3B-4). Similarly, the passing sight distance on a horizontal curve is the distance measured along
159 the center line (or righthand lane line of a three-lane roadway) between two points 3.5 feet above
160 the pavement on a line tangent to the embankment or other obstruction that cuts off the view on
161 the inside of the curve (see Figure 3B-4).

162 The upstream end of a no-passing zone at point "a" in Figure 3B-4 is that point where the
163 sight distance first becomes less than that specified in Table 3B-1. The downstream end of the
164 no-passing zone at point "b" in Figure 3B-4 is that point at which the sight distance again
165 becomes greater than the minimum specified.

166 **Guidance:**

167 *Where the distance between successive no-passing zones is less than 400 feet, no-passing*
168 *markings should connect the zones.*

169 **Support:**

170 No-passing zone signs (see Sections 2B-38, 2B.39, and 2C.53) are sometimes used to
171 emphasize the existence and extent of a no-passing zone.

172 **Standard:**

173 **On three-lane roadways where the direction of travel in the center lane transitions from**
174 **one direction to the other, a no-passing buffer zone, consisting of a flush median island (see**
175 **Section 3J.03) at least 50 feet in length, shall be provided in the center lane as shown in**
176 **Figure 3B-5. A lane-reduction transition (see Section 3B.12) shall be provided approaching**
177 **each end of the buffer zone.**

178

179 **Table 3B-1 Comments:** NCUTCD generally agrees with Table 3B-1 but recommends removing
180 “posted or statutory” for consistency.

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

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

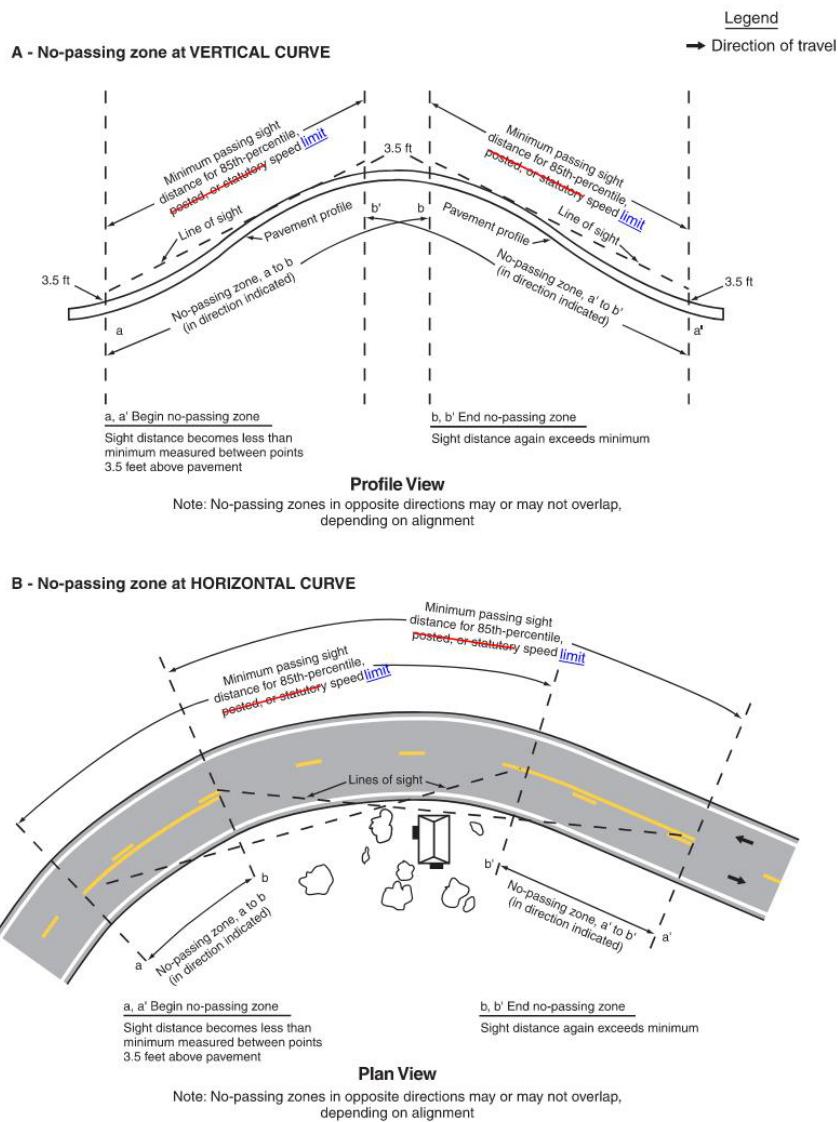
85th-Percentile or Posted or Statutory Speed Limit	Minimum Passing Sight Distance
25 mph	450 feet
30 mph	500 feet
35 mph	550 feet
40 mph	600 feet
45 mph	700 feet
50 mph	800 feet
55 mph	900 feet
60 mph	1,000 feet
65 mph	1,100 feet
70 mph	1,200 feet

182

183 **Figure 3B-4 Comments:** NCUTCD generally agrees with Figure 3B-4 but recommends
184 replacing “posted or statutory speed” with “speed limit” for both examples.

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

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

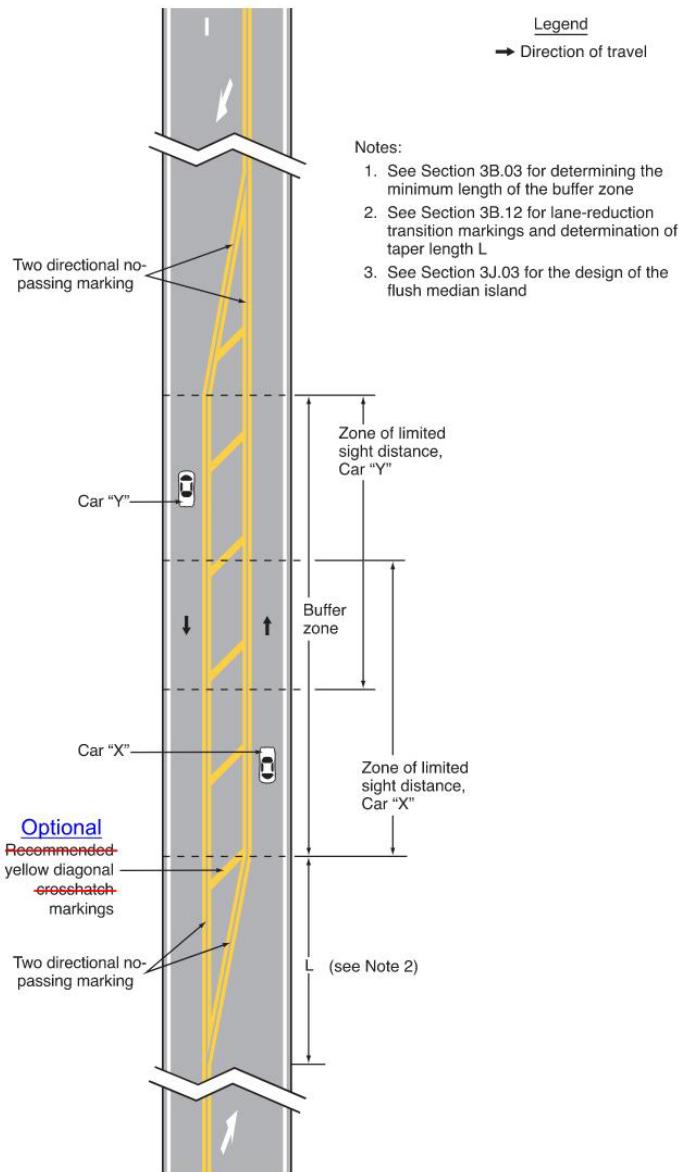


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189 **Figure 3B-5 Comments:** NCUTCD generally agrees with Figure 3B-5 as presented in the NPA,
190 but recommends changing diagonal markings from “recommended” to “optional” to be
191 consistent with NCUTCD recommendations to Section 3B.25.

192 **Figure 3B-5. Example of Application of Three-Lane, Two-Way Marking for Changing**
193 **Direction of the Center Lane**

Figure 3B-5. Example of Application of Three-Lane, Two-Way Marking for
Changing Direction of the Center Lane



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197 **Section 3B.04 Comments:** NCUTCD agrees with 3B.04 as presented in the NPA.

198

199 **Section 3B.04 Yellow Pavement Markings for Reversible Lanes**
200 **Standard:**

201 **If reversible lanes are used, the lane line pavement markings on each side of reversible**
202 **lanes shall consist of a normal width broken double yellow line to delineate the edge of a**
203 **lane in which the direction of travel is reversed from time to time, such that each of these**
204 **markings serve as the center line markings of the roadway during some period (see Figure**
205 **3B-6).**

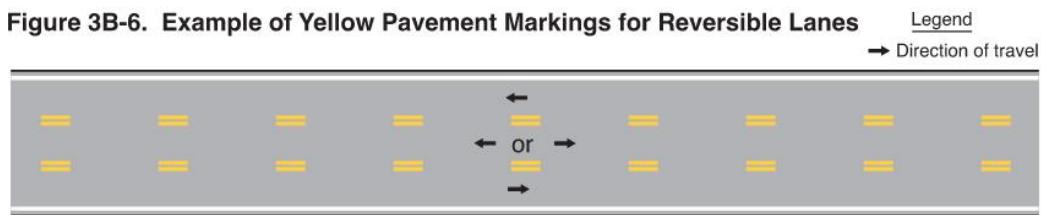
206 **Signs (see Section 2B.35), lane-use control signals (see Chapter 4T), or both shall be used**
207 **to supplement reversible lane pavement markings.**

208 **Support:**

209 Section 3E.02 contains additional applications of pavement markings for counter-flow
210 preferential lanes that also operate as reversible lanes.

212 **Figure 3B-6 Comments: NCUTCD agrees with Figure 3B-6 as presented in the NPA.**

213 **Figure 3B-6. Example of Reversible Lane Marking Application**



221 **Section 3B.05 Comments: NCUTCD generally agrees with 3B.05 as presented in the NPA, but**
222 **recommends revising as follows:**

- Revise the second Guidance statement to note that the restriction on marking two-way left-turn lanes to intersections should apply specifically to signalized intersections.
- Revise the second Support statement to be consistent with Section 8A.06.

223 **Section 3B.05 Pavement Markings for Two-Way Left-Turn Lanes**

224 **Standard:**

225 **If a two-way left-turn lane that is never operated as a reversible lane is used, the lane**
226 **line pavement markings on each side of the two-way left-turn lane shall consist of a normal**
227 **width broken yellow line and a normal width solid yellow line to delineate the edges of a**
228 **lane that can be used by traffic in either direction as part of a left-turn maneuver. These**
229 **markings shall be placed with the broken line toward the two-way left-turn lane and the**
230 **solid line toward the adjacent traffic lane as shown in Figure 3B-7.**

231 **Guidance:**

232 *White two-way left-turn lane-use arrows should be used at or just downstream from the*
233 *beginning of a two-way left-turn lane.*

234 **Option:**

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

238 **Standard:**

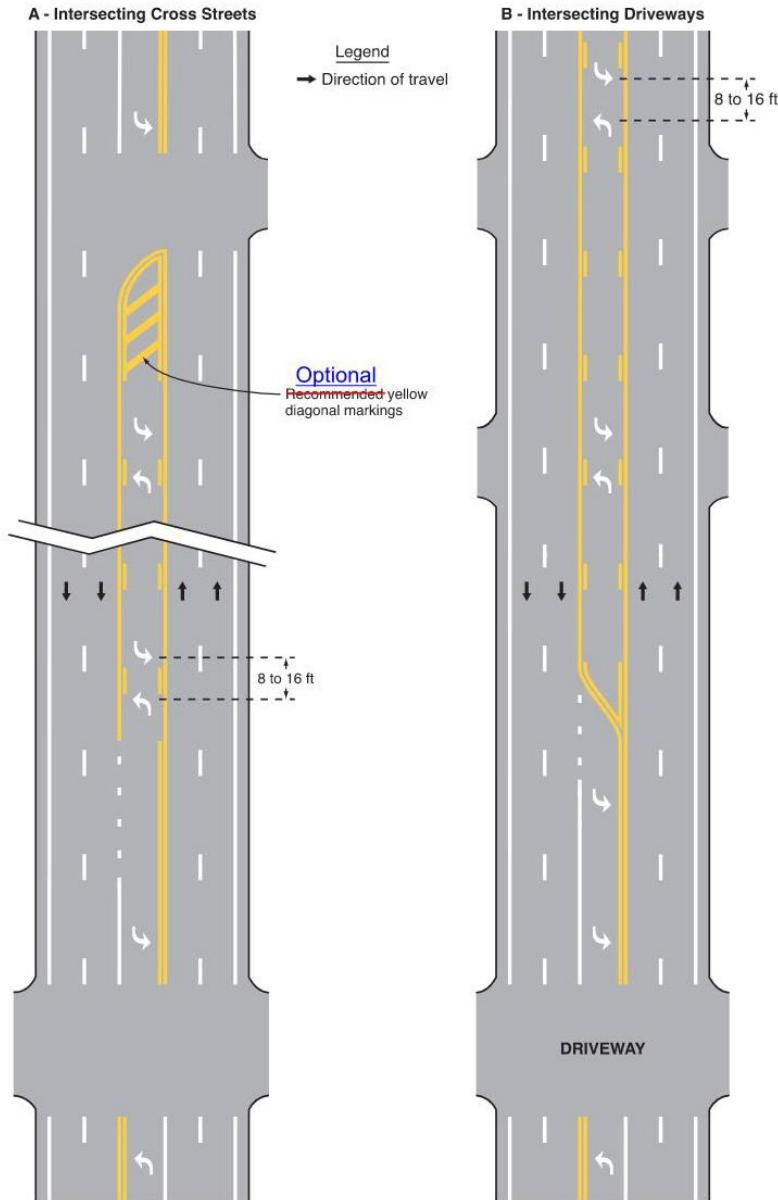
239 **A single-direction lane-use arrow shall not be used in a lane bordered on both sides by**
240 **yellow two-way left-turn lane longitudinal markings.**

241 *Guidance:*
242 *Signs should be used in conjunction with the two-way left turn markings (see Section 2B.33).*
243 *Two-way left-turn lane markings should not extend to intersections controlled by a traffic signal*
244 *devices.* [clarifying text]
245 *Support:*
246 *Two-way left-turn lanes can be transitioned to exclusive left turn lanes as shown in Figure*
247 *3B-7 or painted medians where they approach an intersection.*
248 *Section 8A.06 contains information for discontinuing a two-way left turn lane ~~through~~ in the*
249 *immediate vicinity of a highway rail grade crossing. [Change to be consistent with 8A.06]*
250
251

252 **Figure 3B-7 Comments:** NCUTCD generally agrees with Figure 3B-7 as presented in the NPA,
253 but recommends changing diagonal markings from “recommended” to “optional” to be
254 consistent with NCUTCD recommendations to Section 3B.25.

255 **Figure 3B-7. Example of Two-Way Left-Turn Lane Marking Application**

Figure 3B-7. Example of Two-Way Left-Turn Lane Marking Applications



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259 **Section 3B.06 Comments:** NCUTCD agrees with 3B.06 as presented in the NPA.

260

261 **Section 3B.06 White Lane Line Pavement Markings
Standard:**

262 **When used, lane line pavement markings delineating the separation of traffic lanes that
have the same direction of travel shall be white.**

265 **Lane line markings shall be used on all freeways and Interstate highways.**

266 *Guidance:*

267 *Lane line markings should be used:*

268 *A. On all roadways that are intended to operate with two or more adjacent traffic lanes in*
269 *the same direction of travel, except as otherwise required for reversible lanes.*

270 *B. At congested locations where the roadway will accommodate more traffic lanes with lane*
271 *line markings than without the markings.*

272 *Support:*

273 Examples of lane line markings are shown in Figures 3B-2, 3B-3, and 3B-7 through 3B-13.

274 **Standard:**

275 **Except as provided in Paragraph 1 of Section 3B.07, where crossing the lane line**
276 **markings with care is not discouraged or prohibited, the lane line markings shall consist of**
277 **a normal width broken white line.**

278 **Where crossing the lane line markings is discouraged, the lane line markings shall**
279 **consist of a normal width or wide solid white line.**

280 *Guidance:*

281 *A solid white lane line marking should be used on approaches to:*

282 *A. Intersections to separate a through lane from a mandatory turn lane.*

283 *B. Intersections to separate contiguous mandatory turn lanes from each other.*

284 *C. Toll collection points to separate toll lanes, payment methods, channelized movements, or*
285 *obstructions.*

286 *Option:*

287 Solid white lane line markings may be used:

288 *A. On approaches to intersections to separate contiguous through lanes.*

289 *B. To separate through traffic lanes from auxiliary lanes, such as an added uphill truck lane.*

290 *C. On approaches to crosswalks across multi-lane roadways.*

291 Wide solid lane line markings may be used for greater emphasis.

292 *A curved transition may be used where an edge line, channelizing line, or dotted extension*
293 *line changes direction.*

294 *Support:*

295 *Examples of locations where a curved transition can have value include freeway exit and*
296 *entrance ramps, and turn lanes.*

297 **Standard:**

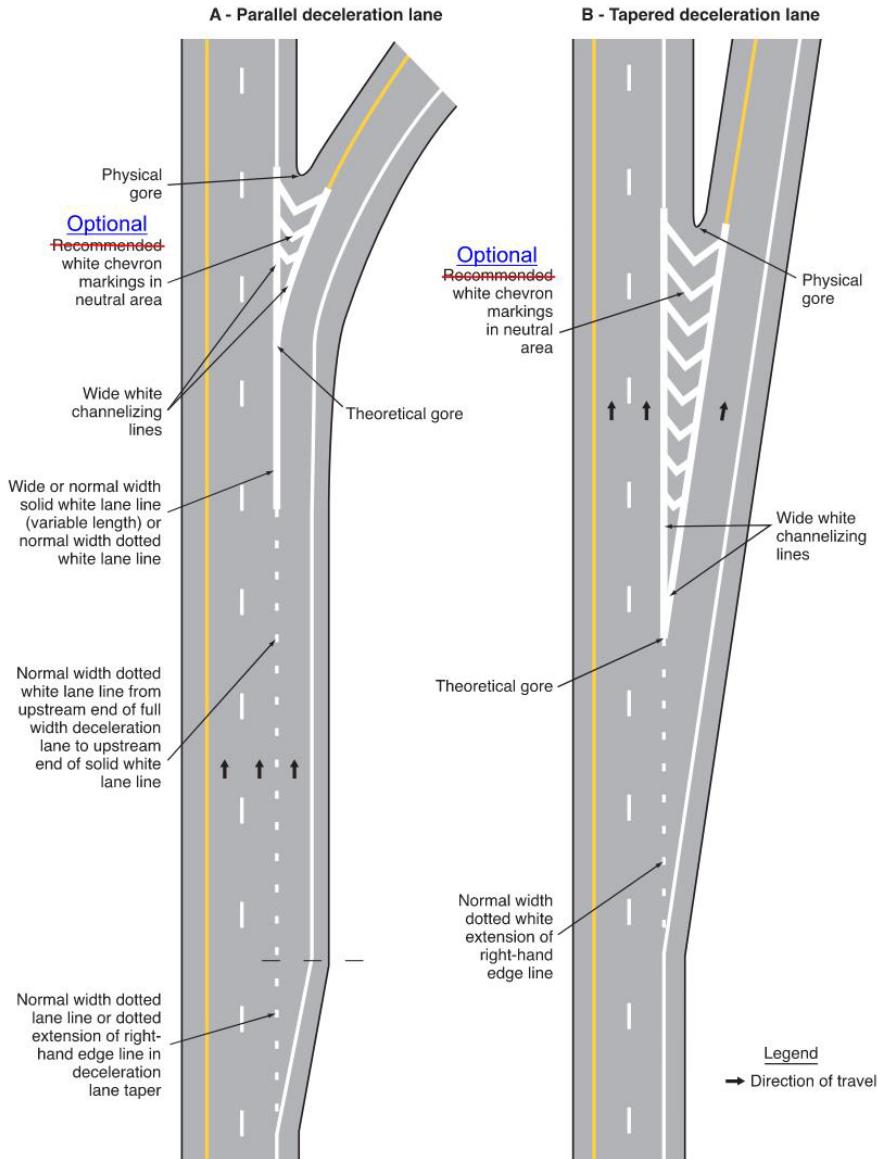
298 **Where crossing the lane line markings is prohibited, the lane line markings shall consist**
299 **of a double solid white line (see Figure 3B-12).**

300

301 **Figure 3B-8 Comments:** NCUTCD generally agrees with Figure 3B-8 as presented in the NPA,
302 but recommends changing diagonal markings from “recommended” to “optional” to be
303 consistent with NCUTCD recommendations to Section 3B.25.

304 **Figure 3B-8. Examples of Dotted Line and Channelizing Line Applications for Exit**
305 **Ramp Markings (2 sheets)**

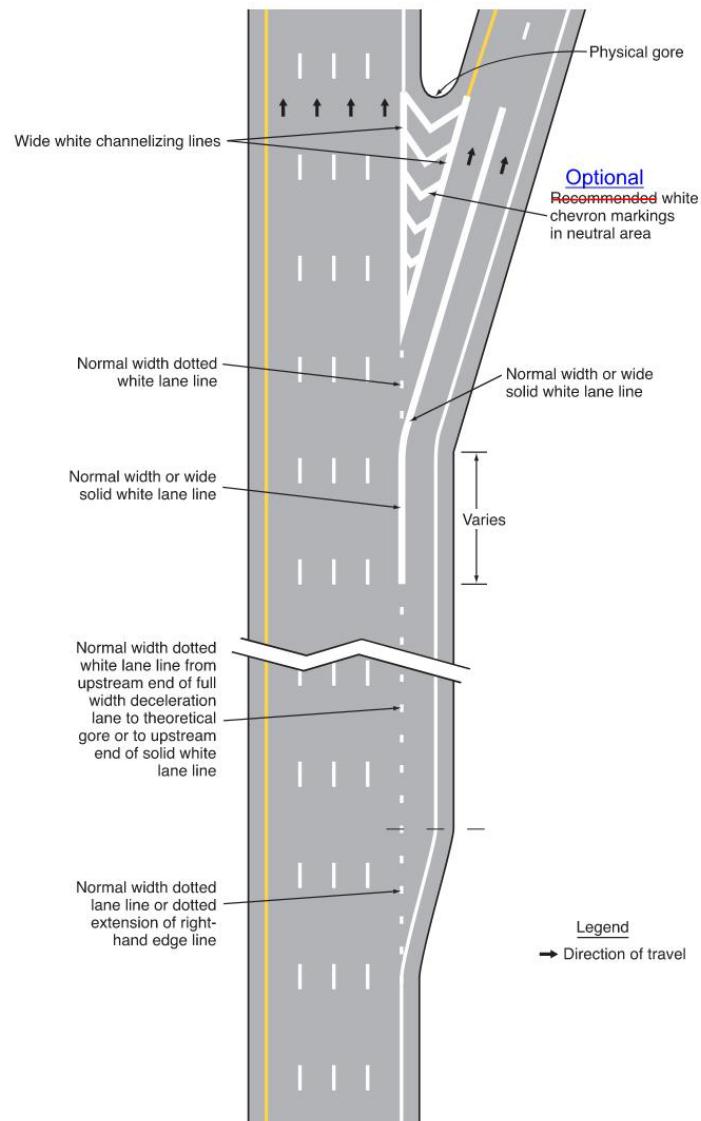
Figure 3B-8. Examples of Dotted Line and Channelizing Line Applications
for Exit Ramp Markings (Sheet 1 of 2)



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307

Figure 3B-8. Examples of Dotted Line and Channelizing Line Applications for Exit Ramp Markings (Sheet 2 of 2)

C – Parallel deceleration lane at a multi-lane exit ramp having an optional exit lane that also carries the through route



309 **Figure 3B-9 Comments:** NCUTCD generally agrees with Figure 3B-9 as presented in the NPA,
310 but recommends revisions as follows:
311

- Delete callouts referencing “0.5 A min” length for the normal width dotted white line in example A
- Change diagonal markings from “recommended” to “optional” to be consistent with NCUTCD recommendations to Section 3B.25

315 **Figure 3B-9. Examples of Dotted Line and Channelizing Line Applications for
316 Entrance Ramp Markings (2 sheets)**

317 **Figure 3B-9. Examples of Dotted Line and Channelizing Line Applications for
318 Entrance Ramp Markings (Sheet 1 of 2)**

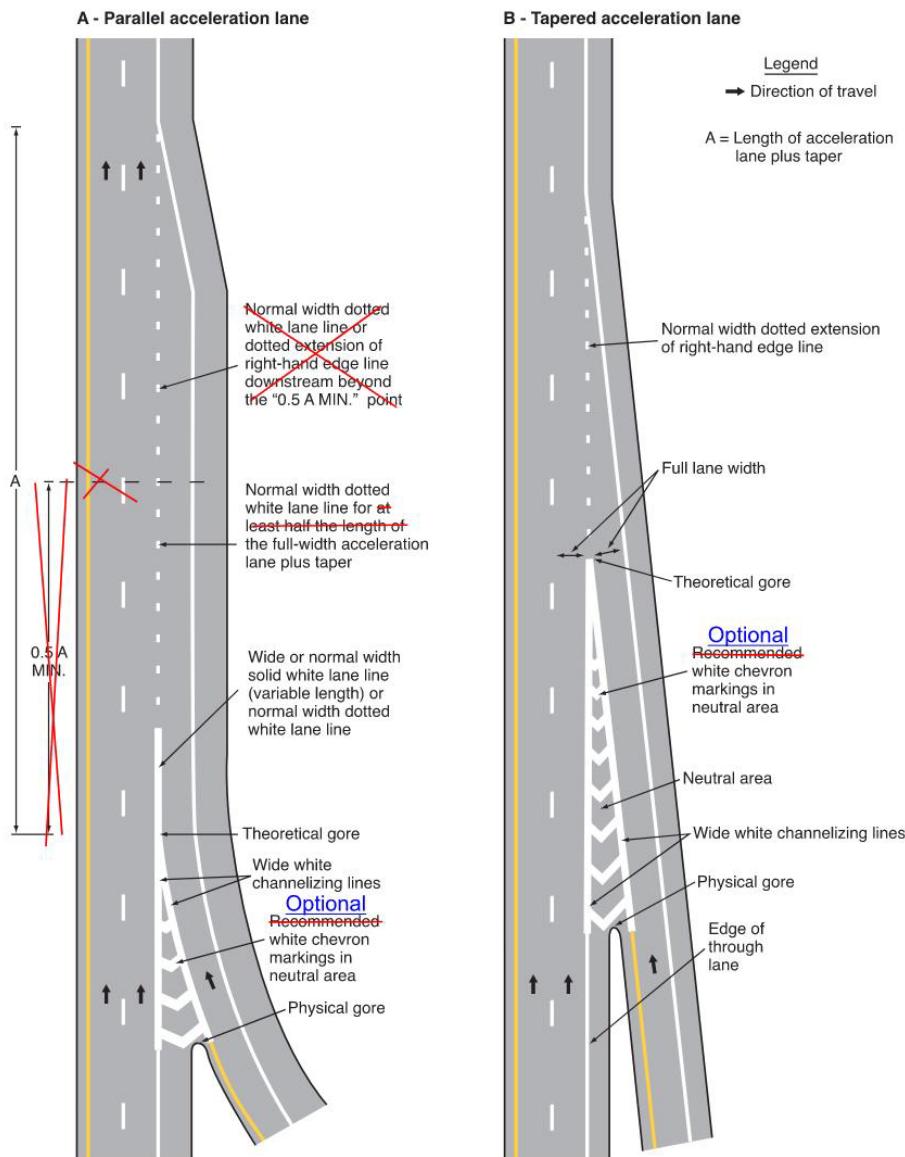
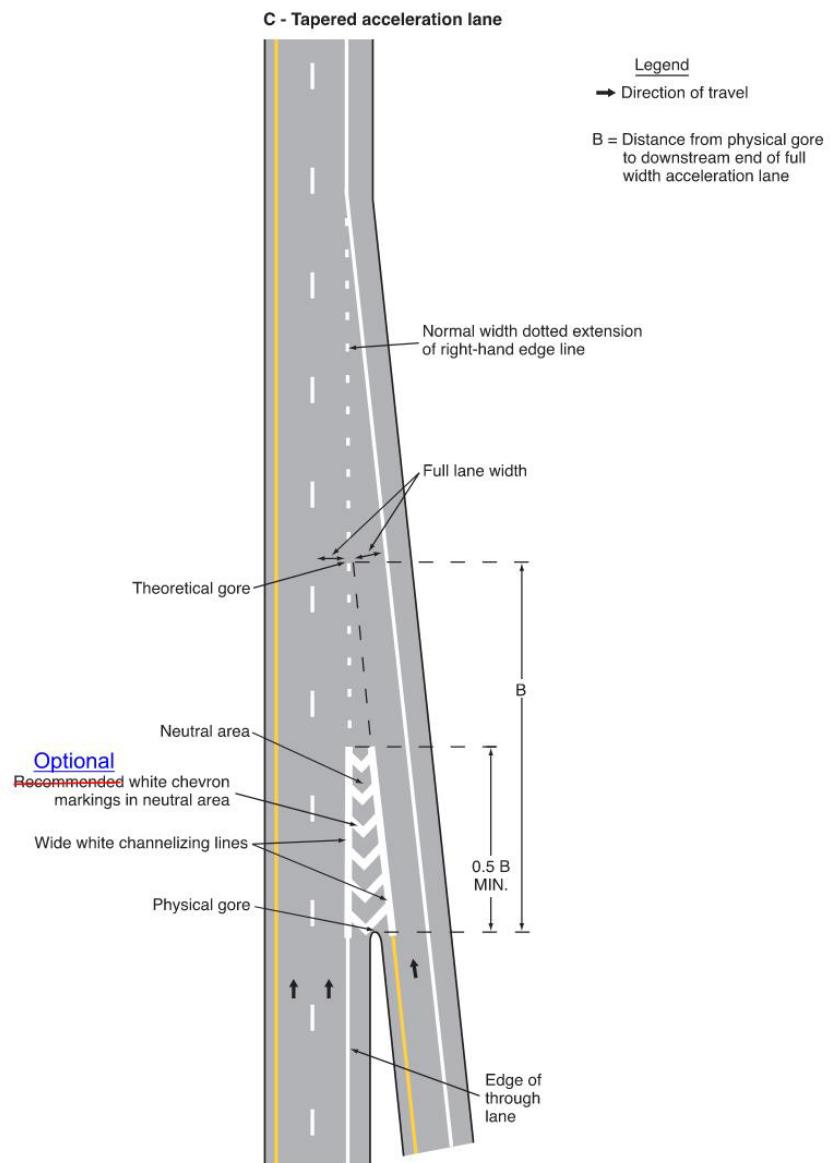


Figure 3B-9. Examples of Dotted Line and Channelizing Line Applications for Entrance Ramp Markings (Sheet 2 of 2)



- 320 **Figure 3B-10 Comments:** NCUTCD generally agrees with Figure 3B-10 as presented in the
 321 NPA, but recommends revisions as follows:
 322 • Change diagonal markings from “recommended” to “optional” to be consistent with
 323 NCUTCD recommendations to Section 3B.25
 324 • Add “variable length” text to examples B, C and E to be consistent with other examples
 325 • Remove “Varies” dimension in example E to be consistent with other examples
 326 • Modify the number of sheets in the title from 5 to 6

Figure 3B-10. Examples of Applications of Freeway and Expressway Lane-Drop Markings (56 sheets)

Figure 3B-10. Examples of Applications of Freeway and Expressway Lane-Drop Markings (Sheet 1 of 6)

A – Lane drop at a single lane exit ramp

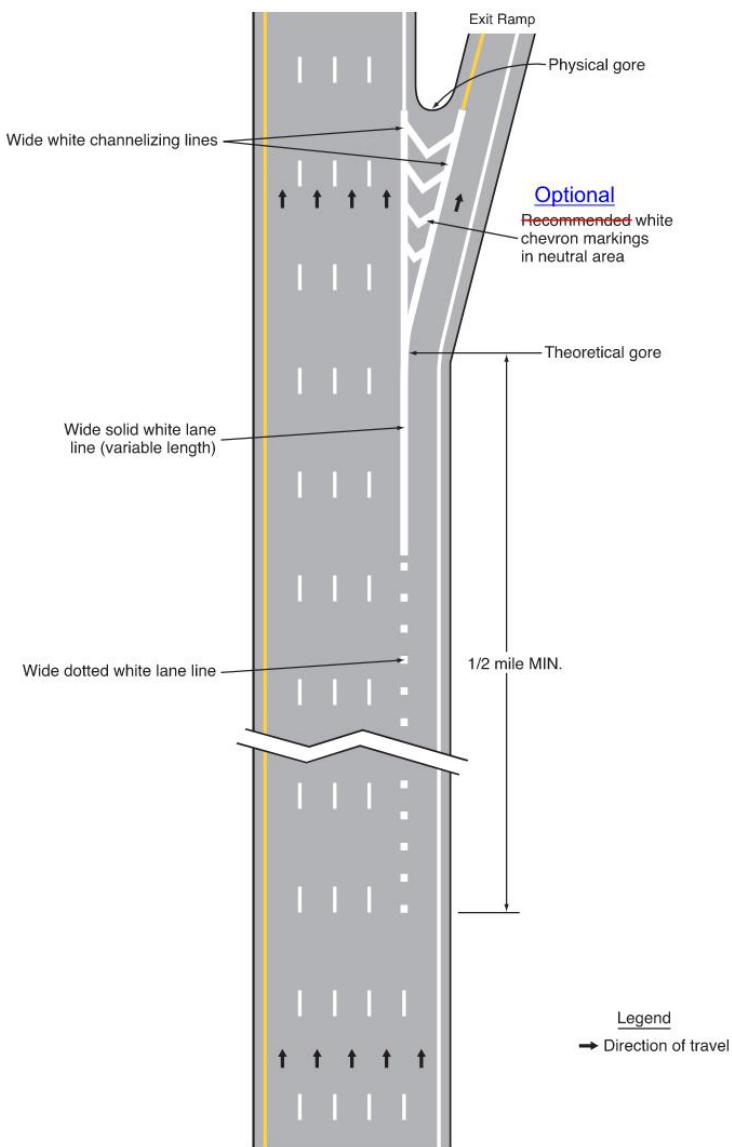


Figure 3B-10. Examples of Applications of Freeway and Expressway Lane-Drop Markings (Sheet 2 of 6)

B – Lane drop at a multi-lane exit ramp having an optional exit lane that also carries the through route

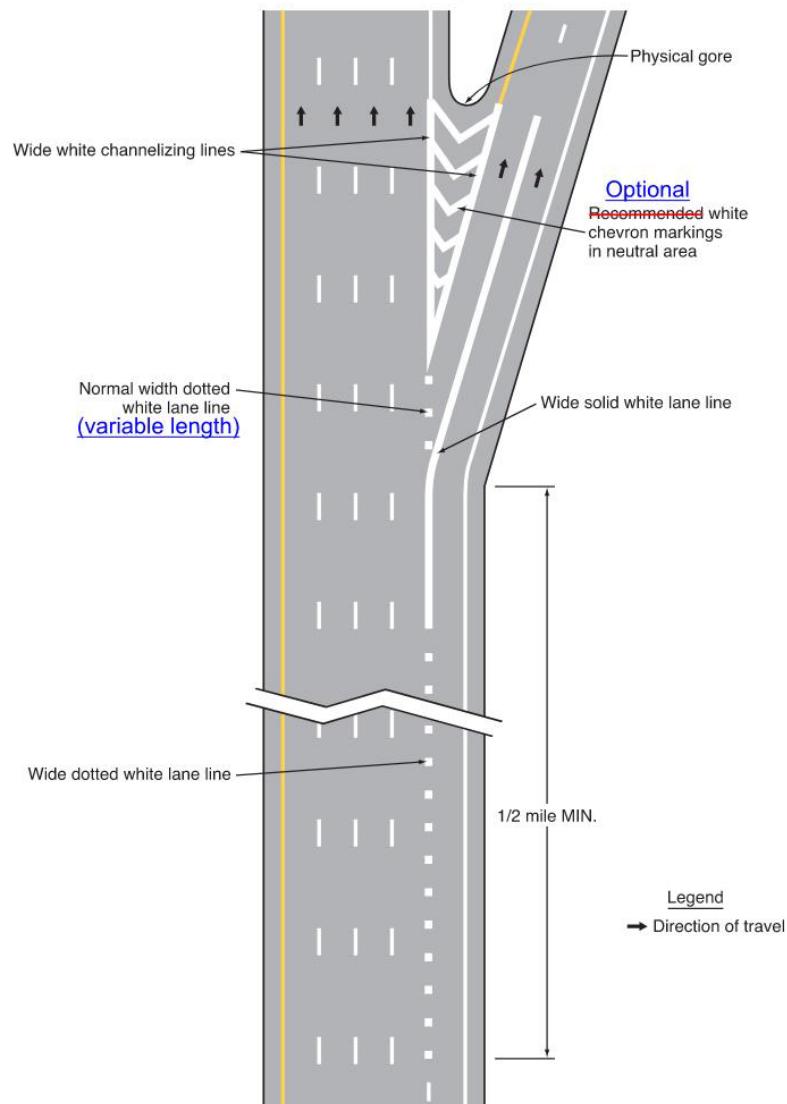


Figure 3B-10. Examples of Applications of Freeway and Expressway Lane-Drop Markings (Sheet 3 of 6)

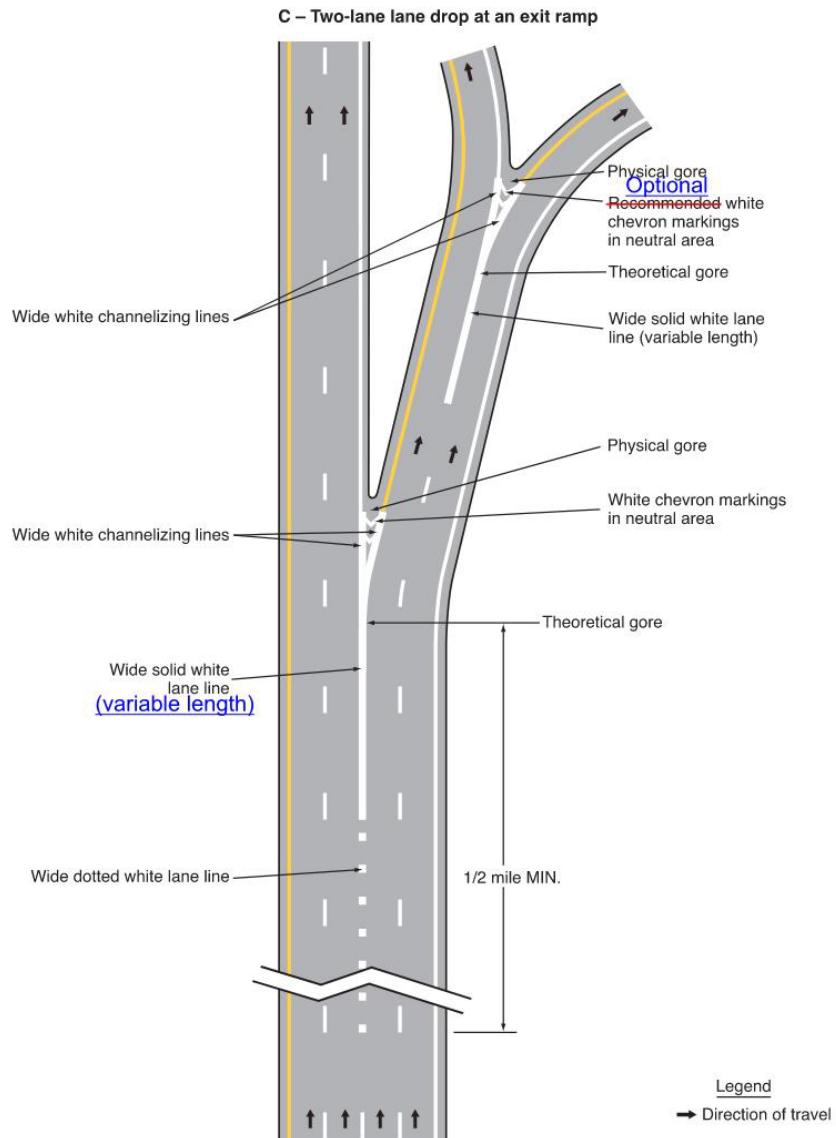


Figure 3B-10. Examples of Applications of Freeway and Expressway Lane-Drop Markings (Sheet 4 of 6)

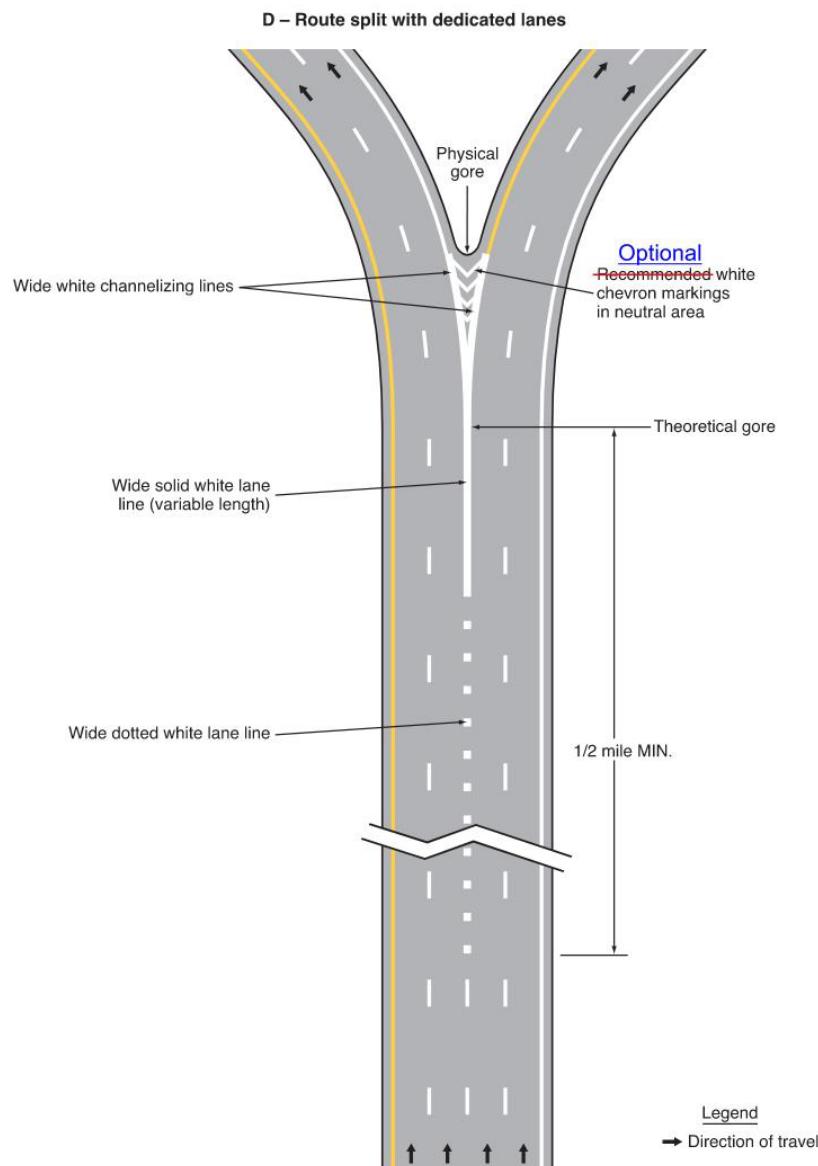


Figure 3B-10. Examples of Applications of Freeway and Expressway Lane-drop Markings (Sheet 5 of 6)

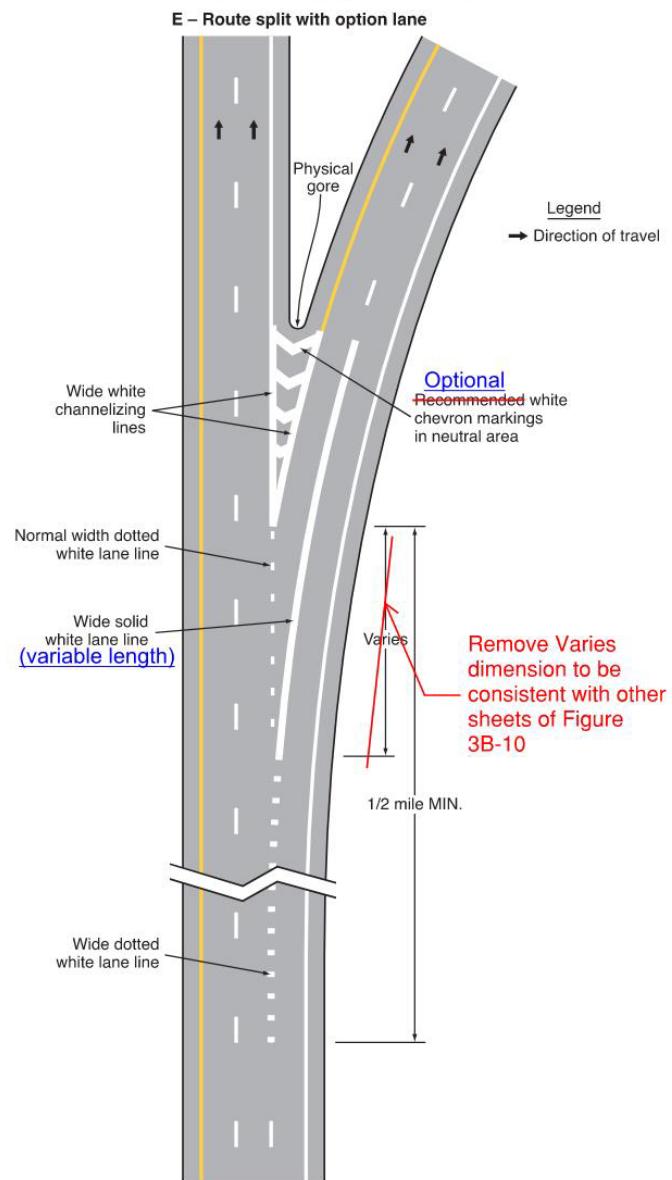
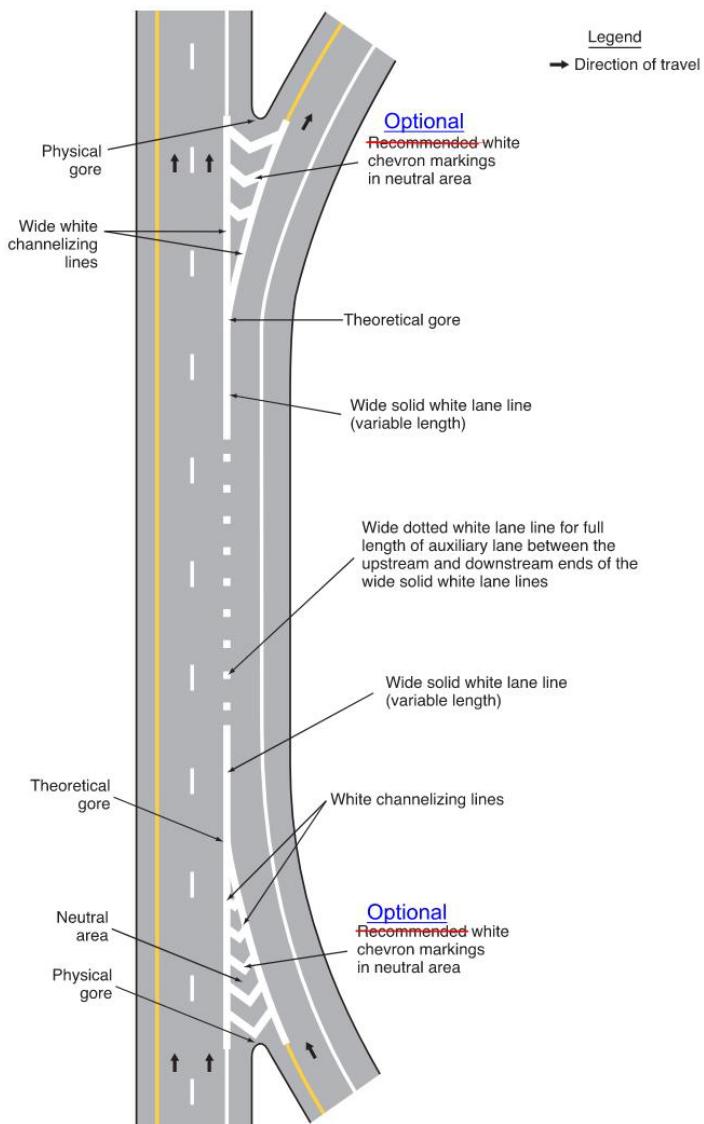


Figure 3B-10. Examples of Applications of Freeway and Expressway Lane-Drop Markings (Sheet 6 of 6)

F – Continuous auxiliary lane, such as at a cloverleaf interchange

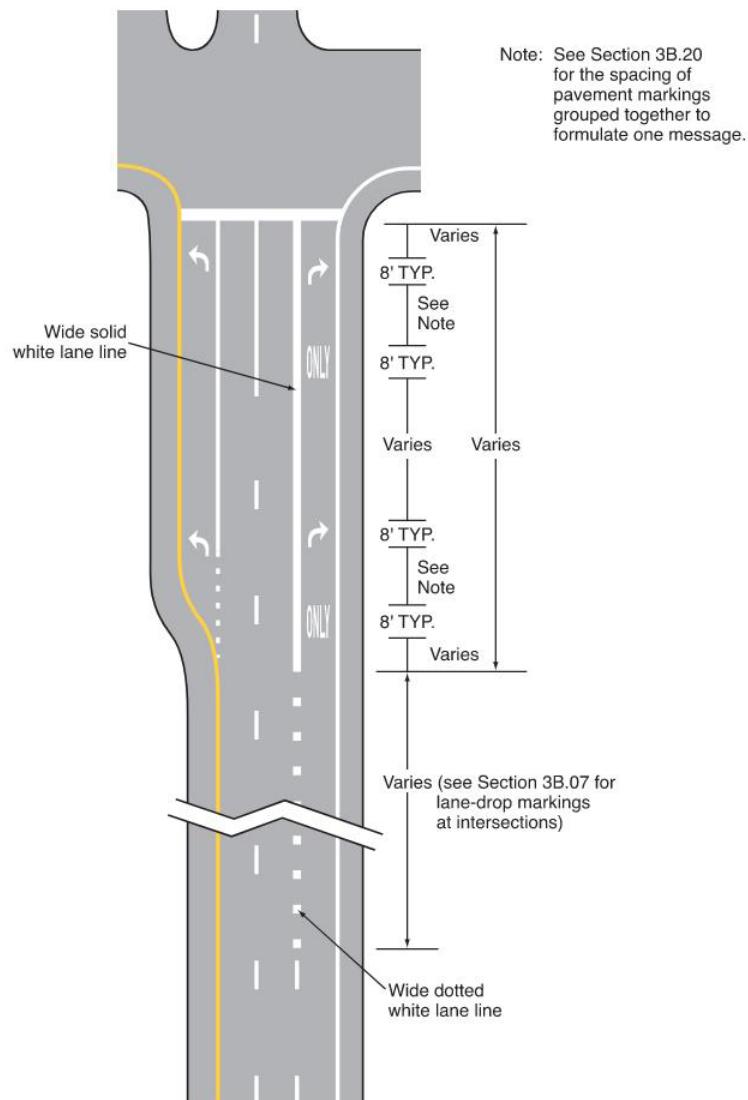


336 **Figure 3B-11 Comments:** NCUTCD agrees with Figure 3B-11 as presented in the NPA.

337 **Figure 3B-11. Examples of Applications of Conventional Road Lane-Drop Markings (2**
338 **sheets)**

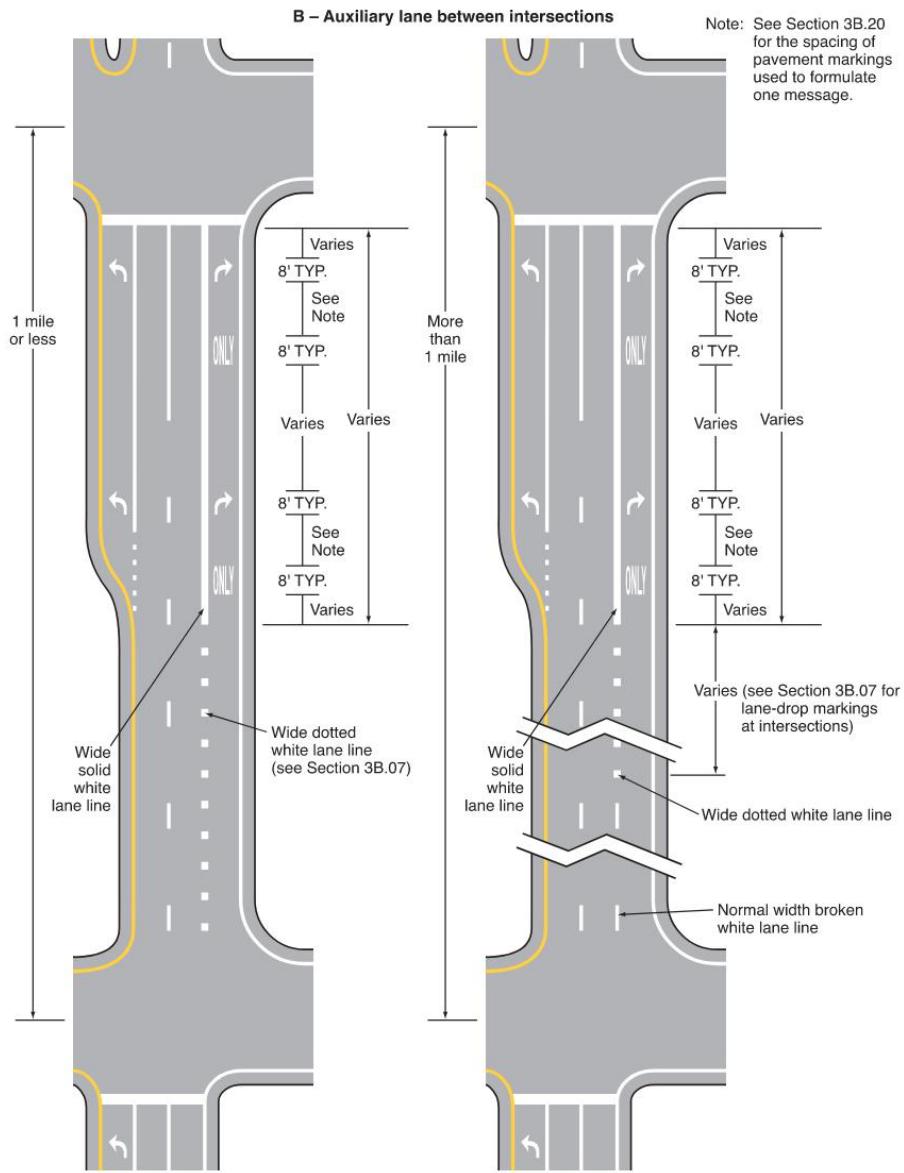
Figure 3B-11. Examples of Applications of Conventional Road Lane-Drop Markings
(Sheet 1 of 2)

A – Lane drop at an intersection



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Figure 3B-11. Examples of Applications of Conventional Road Lane-Drop Markings
 (Sheet 2 of 2)



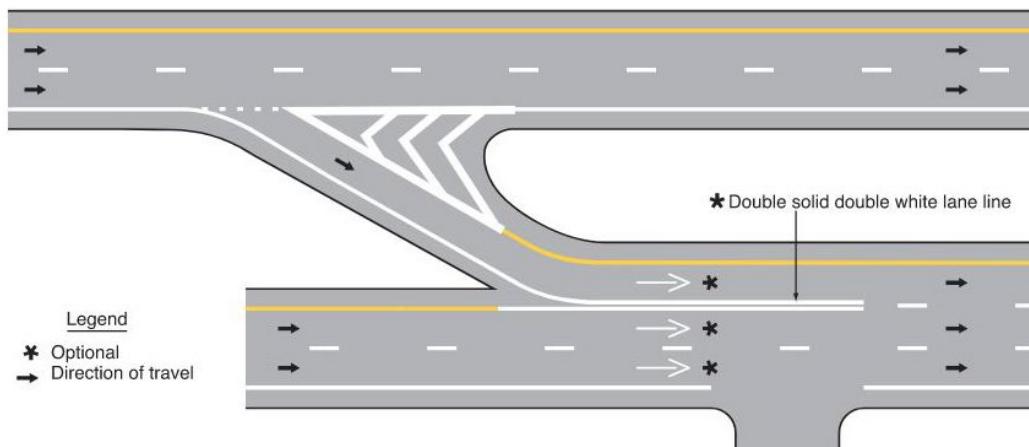
341

Figure 3B-12 Comments: NCUTCD agrees with Figure 3B-12 as presented in the NPA.

342

Figure 3B-12. Example of Solid Double White Lines Used to Prohibit Lane Changing

Figure 3B-12. Example of Double Solid White Line Used to Prohibit Lane Changing



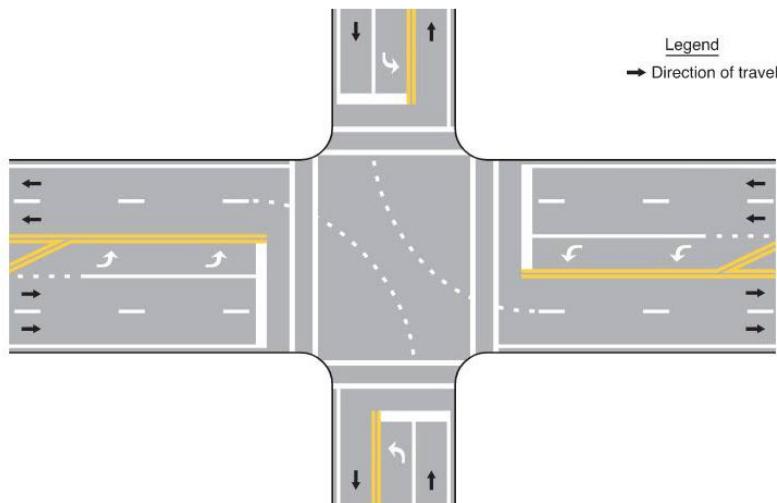
343

344 **Figure 3B-13 Comments:** NCUTCD agrees with Figure 3B-13 sheet 2 of 2 as presented in the
345 NPA. Figure 3B-13 sheet 1 of 2 was missing from the NPA, therefore NCUTCD could not
346 provide comments regarding this figure. NCUTCD recommends adding the figure.

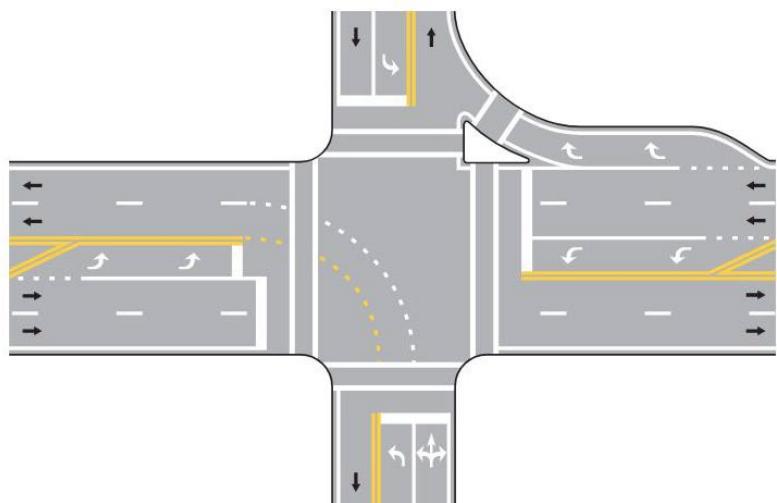
347 **Figure 3B-13. Examples of Line Extensions through Intersections (2 sheets)**

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

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



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



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Section 3B.07 Comments: NCUTCD generally agrees with 3B.07 as presented in the NPA, but recommends revisions per NCUTCD recommendation 19B-MKG-02 as follows:

- Revise the second Standard paragraph to note that this Standard refers to a normal width dotted white lane line extension from the upstream end of a taper to the theoretical gore
- Delete the third Standard paragraph, as it duplicates the content of the second Standard paragraph as revised

- 357 • Revise the fifth Standard paragraph to delete “to a point at least one-half the distance from
358 the theoretical gore” so the marking extends the length of the acceleration lane
359 • Delete the sixth Standard paragraph, as it duplicates the content of the fifth Standard
360 paragraph as revised

361
362 **Section 3B.07 White Lane Line Markings for Non-Continuing Lanes**
363 **Standard:**

364 A normal width dotted white line marking shall be used as the lane line to separate a
365 through lane that continues beyond the interchange or intersection from an adjacent
366 deceleration or acceleration lane.

367 For exit ramps with a parallel deceleration lane, a normal width dotted white lane line
368 extension shall be installed from the upstream end of the ~~full-width deceleration lane taper~~
369 to the theoretical gore or to the upstream end of a solid white lane line, if used, that extends
370 upstream from the theoretical gore as shown in Drawings A and C of Figure 3B-8. [revise
371 per 19B-MKG-02]

372 ~~For exit ramps with a parallel deceleration lane, a normal width dotted white line
373 extension shall be installed in the taper area upstream from the full-width deceleration lane
374 as shown in Drawings A and C of Figure 3B-8.~~ [revise per 19B-MKG-02]

375 For an exit ramp with a tapered deceleration lane, a normal width dotted white line
376 extension shall be installed from the theoretical gore through the taper area such that it
377 meets the edge line at the upstream end of the taper as shown in Drawing B of Figure 3B-8.

378 For entrance ramps with a parallel acceleration lane, a normal width dotted white lane
379 line shall be installed from the theoretical gore or from the downstream end of a solid white
380 lane line, if used, that extends downstream from the theoretical gore, ~~to a point at least one-~~
381 ~~half the distance from the theoretical gore~~ to the downstream end of the acceleration taper,
382 as shown in Drawing A of Figure 3B-9. [revise per 19B-MKG-02]

383 ~~For entrance ramps with a parallel acceleration lane, a normal width dotted white line
384 extension shall be installed from the downstream end of the dotted white lane line to the
385 downstream end of the acceleration taper, as shown in Drawing A of Figure 3B-9.~~ [revise
386 per 19B-MKG-02]

387 For entrance ramps with a tapered acceleration lane, a normal width dotted white line
388 extension shall be installed from the downstream end of the channelizing line adjacent to
389 the through lane to the downstream end of the acceleration taper, as shown in Drawings B
390 and C of Figure 3B-9.

391 A wide dotted white lane line shall be used:

- 392 A. As a lane drop marking in advance of lane drops at exit ramps to distinguish a lane
393 drop from a normal exit ramp (see Drawings A, B, and C of Figure 3B-10),
- 394 B. In advance of freeway route splits with dedicated lanes (see Drawing D of Figure
395 3B-10),
- 396 C. In advance of freeway route splits with an option lane (see Drawing E of Figure 3B-10).
- 398 D. To separate a through lane that continues beyond an interchange from an adjacent
399 continuous auxiliary lane between an entrance ramp and an exit ramp (see Drawing F of
400 Figure 3B-10),
- 401 E. As a lane drop marking in advance of lane drops at intersections to distinguish a
402 lane drop from an intersection through lane (see Drawing A of Figure 3B-11), and

403 **F. To separate a through lane that continues beyond an intersection from an adjacent**
404 **auxiliary lane between two intersections (see Drawing B of Figure 3B-11).**

405 *Guidance:*

406 *Lane drop markings used in advance of lane drops at freeway and expressway exit ramps*
407 *should begin at least 1/2 mile in advance of the theoretical gore.*

408 *On the approach to a multi-lane exit ramp having an optional exit lane that also carries*
409 *through traffic, lane line markings should be used as illustrated in Drawing B of Figure 3B-10.*
410 *In this case, if the right-most exit lane is an added lane such as a parallel deceleration lane, the*
411 *lane drop marking should begin at the upstream end of the full-width deceleration lane, as*
412 *shown in Drawing C of Figure 3B-8.*

413 *Lane drop markings used in advance of lane drops at intersections should begin a distance in*
414 *advance of the intersection that is determined by engineering judgment as suitable to enable*
415 *drivers who do not desire to make the mandatory turn to move out of the lane being dropped*
416 *prior to reaching the queue of vehicles that are waiting to make the turn. The lane drop marking*
417 *should begin no closer to the intersection than the most upstream regulatory or warning sign*
418 *associated with the lane drop.*

419 *The dotted white lane lines that are used for lane drop markings and that are used as a lane*
420 *line separating through lanes from auxiliary lanes should consist of line segments that are 3 feet*
421 *in length separated by 9-foot gaps.*

422 *Support:*

423 Sections 3B.21 and 3B.23 contain information regarding other markings that are associated
424 with lane drops, such as ONLY word pavement markings and lane-use arrows.

425 Section 3B.12 contains information about the lane line markings that are to be used for
426 transition areas where the number of through lanes is reduced at a location that is not at an
427 interchange or intersection.

428 *Option:*

429 In the case of a lane drop at an exit ramp or intersection, such a solid white line may replace
430 a portion, but not all of the length of the wide dotted white lane line.

433 **Section 3B.08 Comments:** NCUTCD generally agrees with 3B.08 as presented in the NPA, but
434 recommends revising the first Support statement by replacing the second “entrance” with “exit”
435 and correcting the Figure 2B.11 reference.

437 **Section 3B.08 Channelizing Lines**

438 *Support:*

439 Channelizing lines are used to form neutral areas where traffic traveling in the same general
440 direction is permitted on both sides including entrance and ~~entrance~~ exit ramps, access and
441 egress points to and from managed-lanes, toll-plaza bypasses, and left turn lanes separated from
442 through lanes (see Figure 2B-11). [editorial comments]

443 Chapter 3J contains information for the application of channelizing lines used in conjunction
444 with islands.

445 *Standard:*

446 **Except as provided in Paragraph 6 of Section 3J.05, a channelizing line shall be a solid**
447 **wide or double white line.**

448 *Support:*

449 Examples of channelizing line applications are shown in Figures 3B-8, 3B-9, 3B-10,
450 Drawing C of Figure 3B-15, and Figures 3J-1 through 3J-3.
Standard:

452 **For all exit ramps and for entrance ramps with parallel acceleration lanes, channelizing
453 lines shall be placed on both sides of the neutral area (see of Figures 3B-8 and 3B-10 and
454 Drawing A of Figure 3B-9).**

455 **For entrance ramps with tapered acceleration lanes, channelizing lines shall be placed
456 along both sides of the neutral area to a point at least one-half of the distance to the
457 theoretical gore (see Drawing C of Figure 3B-9).**

458 **Channelizing lines shall be placed on both sides of the neutral area for bifurcations
459 created from open-road tolling lanes that bypass a conventional toll plaza.**

460 **Where neutral areas are formed at access and egress points to and from a managed-
461 lane facility, channelizing lines shall be placed on both sides of the neutral area (see Figures
462 2G-8, 2G9, 2G-22, 2G-23, and 2G-25).**

463 Option:

464 For entrance ramps with tapered acceleration lanes, the channelizing lines may extend to the
465 theoretical gore as shown in Drawing B of Figure 3B-9.

466 **Standard:**

467 **Other pavement markings in the neutral area shall be white.**

468 **Support:**

469 **Pavement markings within the neutral area include chevron markings (see Section 3B.25),
470 retroreflective raised pavement markers (see Section 3B.17), and internally illuminated raised
471 pavement markers (see Section 3B.19).**

473

474 **Section 3B.09 Comments:** NCUTCD generally agrees with 3B.09 as presented in the NPA, but
475 recommends deleting the Guidance statement calling for 6 inch wide edge lines on two-way
476 roadways. Although 6 inch edge lines can show operational and safety benefits, resource and
477 funding limitations may restrict an agency from the ability to consistently install and maintain
478 wider lines, and could result in agencies choosing to omit edge lines entirely on some roadways,
479 which would be counterproductive. NCUTCD also recommends revising a Section reference in
480 the Guidance statement.

481

482 **Section 3B.09 Edge Line Pavement Markings**

483 **Standard:**

484 **If used, edge line pavement markings shall delineate the right or left edges of a roadway.**

485 **Except as provided in Paragraph 9 of Section 3E.04, right edge line pavement markings,
486 if used, shall consist of a normal width solid white line to delineate the right-hand edge of the
487 roadway.**

488 **Guidance:**

489 **Regardless of the width of the normal line used on the roadway, edge lines on two-lane
490 roadways should be at least 6 inches wide.** [delete Guidance on 6 inch edge lines]

491 **Standard:**

492 **If used on the roadways of divided highways or one-way streets, or on any ramp in the**
493 **direction of travel, left edge line pavement markings shall consist of a normal width solid**
494 **yellow line to delineate the left-hand edge of a roadway or to indicate driving or passing**
495 **restrictions left of these markings, except as provided in Paragraph 9 of Section 3E.04.**

496 *Guidance:*

497 *Edge line markings should not be continued through intersections or major driveways,*
498 *except for the following situations:*

499 A. *Dotted edge line extensions (see Section 3B.08-3B.11), or [editorial]*

500 B. *Through that part of an intersection with no intersection approach (such as the top of a T*
501 *intersection).*

502 Support:

503 Section 3B.11 contains information on the use and application of edge lines through
504 intersections, interchanges, and driveways.

505 Option:

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

509 **Section 3B.10 Comments:** NCUTCD agrees with 3B.10 as presented in the NPA.

511 **Section 3B.10 Warrants for Use of Edge Lines**

512 **Standard:**

513 **Edge line markings shall be placed on paved streets or highways with the following**
514 **characteristics:**

515 A. **Freeways,**

516 B. **Expressways, and**

517 C. **Rural arterials with a traveled way of 20 feet or more in width and an ADT of 6,000**
518 **vehicles per day or greater.**

519 *Guidance:*

520 *Edge line markings should be placed on paved streets or highways with the following*
521 *characteristics:*

522 A. *Rural arterials and collectors with a traveled way of 20 feet or more in width and an ADT*
523 *of 3,000 vehicles per day or greater.*

524 B. *On other paved streets and highways where an engineering study indicates a need for*
525 *edge line markings.*

526 *Edge line markings should not be placed where an engineering study or engineering*
527 *judgment indicates that providing them is likely to decrease safety.*

528 Option:

529 Edge line markings may be placed on streets and highways with or without center line
530 markings.

531 Edge line markings may be excluded, based on engineering judgment, for reasons such as if
532 the traveled way edges are delineated by curbs, parking, or other markings.

533 If a bicycle lane is marked on the outside portion of the traveled way, the edge line that
534 would mark the outside edge of the bicycle lane may be omitted.

535 Edge line markings may be used where edge delineation is desirable to minimize
536 unnecessary driving on paved shoulders or on refuge areas that have lesser structural pavement
537 strength than the adjacent roadway.

539
540 **Section 3B.11 Comments:** NCUTCD generally agrees with 3B.11 as presented in the NPA, but
541 recommends revising the definition number in the second Support statement.

542
543 **Section 3B.11 Application of Pavement Markings Through Intersections or Interchanges**
544 Support:

545 Section 8C.05 contains information about the extension of edge lines through grade crossing
546 areas. Section 9E.03 contains information for the extensions of bicycle lanes through
547 intersections.

548 In accordance with Definition [101](#) [106](#) in Section 1C.02, driveway connections can be
549 considered as intersections. [editorial]

550 **Standard:**

551 **Pavement markings extended into or continued through an intersection or interchange**
552 **area shall be the same color as the line markings they extend.**

553 *Guidance:*

554 *Pavement markings extended into or continued through an intersection or interchange area*
555 *should be at least the same width as the line markings they extend. (See Figure 3B-13).*

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

562 *Where greater restriction is preferred, solid lane lines or channelizing lines should be*
563 *extended into or continued through intersections.*

564 **Standard:**

565 **Extensions of center lines through intersections shall be dotted lines.**

566 Option:

567 Dotted edge line extensions may be placed through intersections

568 **Standard:**

569 **Solid lines shall not be used to extend edge lines into or through intersections or major**
570 **driveways except through that part of an intersection with no intersecting approach (such**
571 **as at the top of a T-intersection).**

572 *Guidance:*

573 *Edge line markings should be discontinued across intersecting approaches at intersections*
574 *or interchanges.*

575 *Driveways that do not meet the definition of an intersection should have edge line markings*
576 *maintained across the intersecting approach of the driveway.*

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

581 **Section 3B.12 Comments:** NCUTCD generally agrees with 3B.12 as presented in the NPA, but
582 recommends revising Item "A" of the Guidance statement to be consistent with Section 3G.04.

583 **Section 3B.12 Lane-Reduction Transitions**

584 Support:

585 A lane-reduction is where the number of through lanes is reduced at a location that is not at
586 an interchange or intersection because of narrowing of the roadway or because of a section of on-
587 street parking in what would otherwise be a through lane.

588 Section 3B.07 contains information on pavement markings for lane drops and splits. Section
589 2C.48 contains information for warning signing used for lane reductions.

590 **Standard:**

591 **Lane-reduction transitions (see Figure 3B-14) shall include the following elements:**

592 **A. A no-passing zone (see Section 3B.03) to prohibit passing in the direction of the**
593 **convergence and through the transition area except where not applicable such as one-way**
594 **streets, expressways, and freeways, and**

595 **B. An edge line (see Section 3B.09) in the direction of the convergence and through the**
596 **transition area, except as provided in Paragraph 11.**

597 **Guidance:**

598 Except as provided in Paragraph 11, the edge line marking should be installed from the
599 location of the Lane Ends warning sign to beyond the beginning of the narrower roadway.

600 Option:

601 On roadways with operating speeds less than 25 mph where curbs clearly define the roadway
602 edge in the lane-reduction transition, or where a through lane becomes a parking lane, the edge
603 line may be omitted as determined by engineering judgment.

604 **Guidance:**

605 *Lane-reduction transitions should include the following elements:*

606 **A. When used, Delineators delineators installed adjacent to the lane or lanes reduced for**
607 **the full length of the transition and should be so placed and spaced (see Section 3G.04) to show**
608 **the reduction except as provided in Paragraph 11 and except as provided in Paragraph 2 of**
609 **Section 3G.03 for freeways and expressways, and [revise for consistency with Section 3G.04 -**
610 **FHWA should verify paragraph references]**

611 **B. Lane-reduction arrow markings (see Drawing F in Figure 3B-21) on the roadway with**
612 **a speed limit of 45 mph or more, and**

613 **C. A termination of the broken white lane line at a point that is one-quarter of the advance**
614 **warning distance (see Section 2C.04) between the Lane Ends sign (see Section 2C.47) and the**
615 **point where the transition taper begins.**

616 *For roadways having a speed limit of 45 mph or greater, the transition taper length for a*
617 *lane reduction transition should be computed by the formula $L = WS$, where L equals the taper*
618 *length in feet, W equals the width of the offset distance in feet, and S equals the 85th-percentile*
619 *speed or the speed limit, whichever is higher. For roadways where the speed limit is less than 45*
620 *mph, the formula $L = WS^2/60$ should be used to compute the taper length.*

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

623 *Where observed speeds exceed speed limits, longer tapers should be used.*

624 Option:

626 The minimum taper length may be less than 100 feet on roadways where the operating speed
627 is less than 25 mph.

628 On new construction, where no speed limit has been established, the design speed may be
629 used in the transition taper length formula.

630 On low-speed urban roadways where curbs clearly define the roadway edge in the lane-
631 reduction transition, or where a through lane becomes a parking lane, delineators may be omitted
632 as determined by engineering judgment.

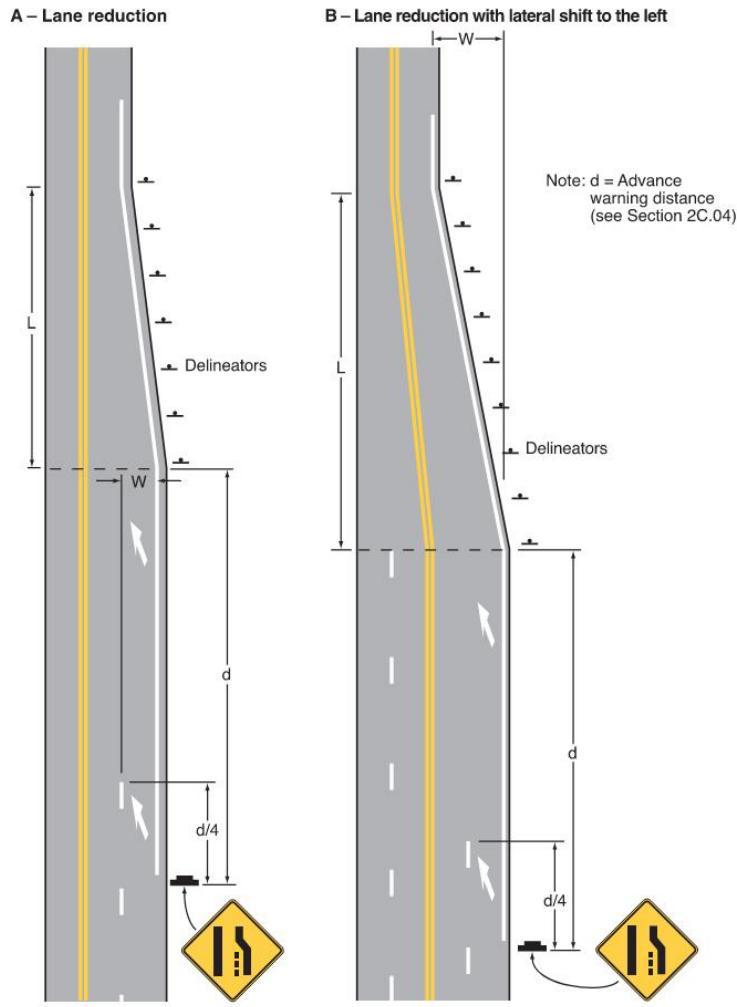
633 Where a lane-reduction transition occurs on a roadway with a speed limit of less than 45
634 mph, lane reduction arrow markings may be used.

635 Lane-reduction arrow markings may be used in long acceleration lanes based on engineering
636 judgment.

637 **Figure 3B-14 Comments:** NCUTCD generally agrees with Figure 3B-14 as presented in the
638 NPA, but recommends showing all signs and dimensions consistently with other Figures in other
639 chapters of the MUTCD related to lane ends signing and markings.

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

Figure 3B-14. Lane-Reduction Transitions



645 **Section 3B.13 Comments:** NCUTCD agrees with 3B.13 as presented in the NPA.

646

647 **Section 3B.13 Approach Markings for Obstructions**

648 **Standard:**

649 **Pavement markings shall be used to guide traffic away from fixed obstructions within a**
650 **paved roadway. Approach markings for bridge supports, refuge islands, median islands,**
651 **toll plaza islands, and raised channelization islands shall consist of a tapered line or lines**
652 **extending from the center line or the lane line to a point 1 to 2 feet to the right-hand side,**
653 **or to both sides, of the approach end of the obstruction (see Figure 3B-15).**

654 **Guidance:**

655 *For roadways having a speed limit of 45 mph or greater, the taper length of the tapered line*
656 *markings should be computed by the formula $L = WS$, where L equals the taper length in feet, W*
657 *equals the width of the offset distance in feet, and S equals the 85th-percentile speed or the speed*
658 *limit, whichever is higher. For roadways where the speed limit is less than 45 mph, the formula*
659 *$L = WS2/60$ should be used to compute the taper length.*

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

661 **Option:**

662 The minimum taper length may be less than 100 feet on roadways where the operating speed
663 is less than 25 mph.

664 **Standard:**

665 **If traffic is required to pass only to the right of the obstruction, the markings shall**
666 **consist of a two-direction no-passing zone marking at least twice the length of the diagonal**
667 **portion as determined by the appropriate taper formula (see Drawing A of Figure 3B-15).**

668 **Option:**

669 If traffic is required to pass only to the right of the obstruction, yellow diagonal markings
670 (see Section 3B.25) may be placed in the flush median area (see Section 3J.03) between the no-
671 passing zone markings as shown in Drawings A and B of Figure 3B-15.

672 **Standard:**

673 **If traffic can pass either to the right or left of the obstruction, the markings shall consist**
674 **of two channelizing lines diverging from the lane line, one to each side of the obstruction.**
675 **In advance of the point of divergence, a wide solid white line or normal width double solid**
676 **white line shall be extended in place of the broken lane line for a distance equal to the**
677 **length of the diverging lines (see Drawing C of Figure 3B-15).**

678 **Option:**

679 If traffic can pass either to the right or left of the obstruction, additional white chevron
680 markings (see Section 3B.25) may be placed in the flush neutral area between the channelizing
681 lines as shown in Drawing C of Figure 3B-15. Other markings, such as white delineators, white
682 channelizing devices, white raised pavement markers, and white crosswalk markings may also be
683 placed in the flush neutral area.

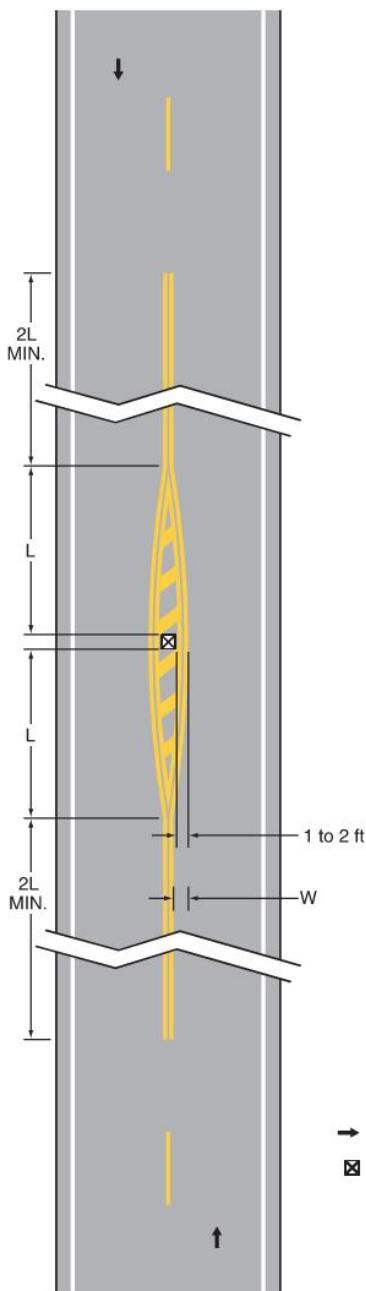
684

685 **Figure 3B-15 Comments:** NCUTCD agrees with Figure 3B-15 as presented in the NPA.

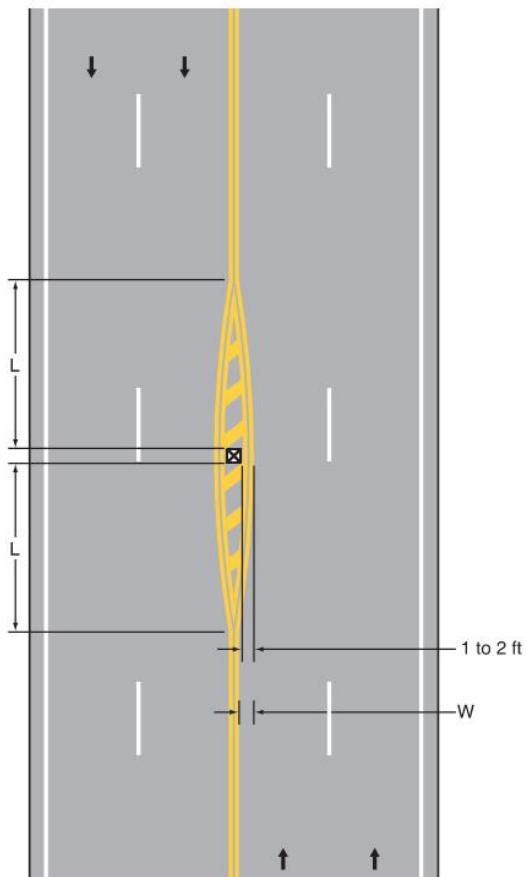
686 **Figure 3B-15. Examples of Applications of Markings for Obstructions in the Roadway**
687 **(2 sheets)**

Figure 3B-15. Examples of Applications of Markings for Obstructions in the Roadway
(Sheet 1 of 2)

A - Center of a two-lane road



B - Center of a four-lane road



For speeds 45 mph or more: $L = WS$
For speeds less than 45 mph: $L = WS^2/60$
 $S = \text{Posted, 85th-percentile, or statutory speed in mph}$
 $W = \text{Offset distance in feet}$

Legend

- Direction of travel
- ☒ Obstruction

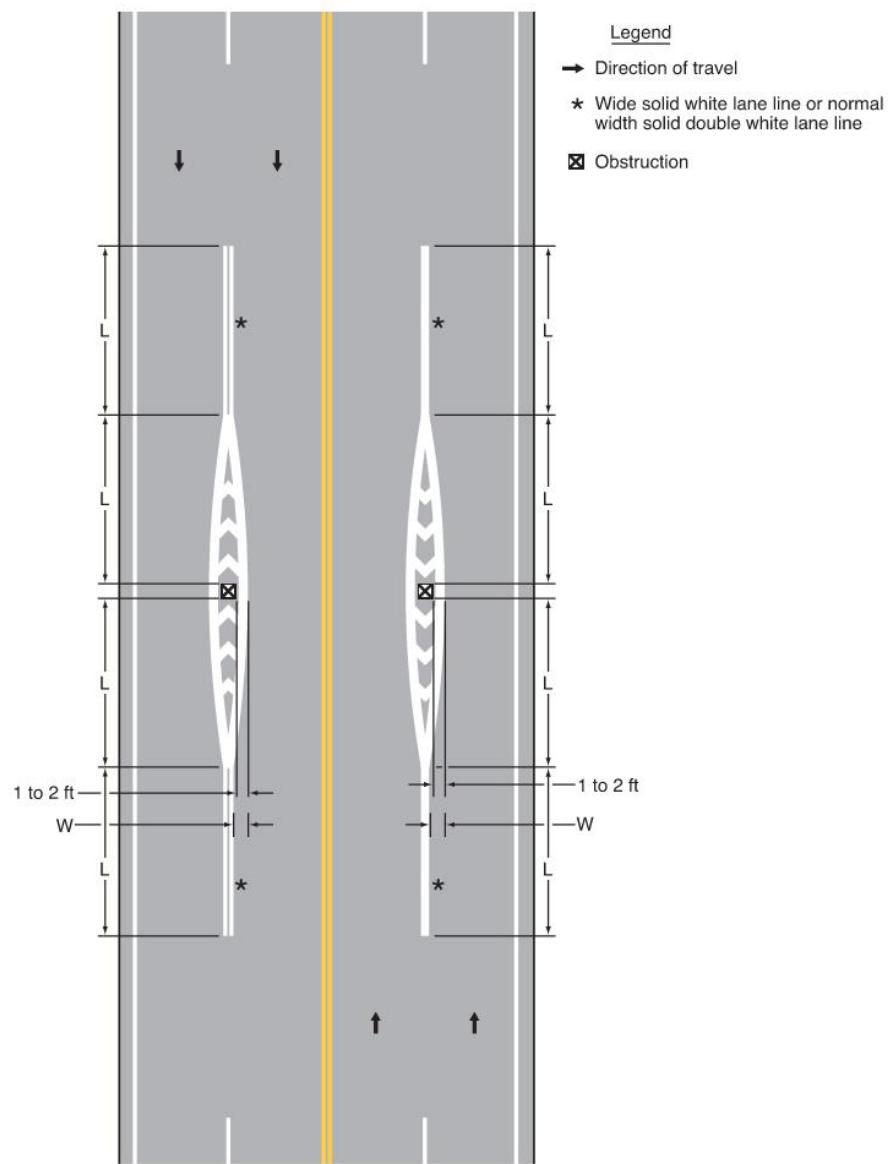
Minimum length of : $L = 100 \text{ feet in urban areas}$
 $L = 200 \text{ feet in rural areas}$

Length "L" should be extended as required by
sight distance conditions

688

Figure 3B-15. Examples of Applications of Markings for Obstructions in the Roadway
 (Sheet 2 of 2)

C - Traffic passing in the same direction on both sides of an obstruction



For speeds of 45 mph or more: $L = WS$
 For speeds less than 45 mph: $L = WS^2/60$
 S = Posted, 85th-percentile, or statutory speed in mph
 W = Offset distance in feet

Minimum length of: $L = 100$ feet in urban areas
 $L = 200$ feet in rural areas

Length "L" should be extended as required by sight distance conditions

689

690

691

692 **Section 3B.14 Comments:** NCUTCD agrees with 3B.14 as presented in the NPA.

693

694 **Section 3B.14 Raised Pavement Markers – General**

695 Support:

696 Section 9A.03 contains information for the application of raised pavement markers to bicycle
 697 facilities.

698 **Standard:**

699 **The color of raised pavement markers under both daylight and nighttime conditions**
700 **shall conform to the color of the marking for which they serve as a positioning guide, or for**
701 **which they supplement or substitute.**

702 Option:

703 The side of a raised pavement marker that is visible to traffic proceeding in the wrong
704 direction may be red (see Section 3A.05).

705 Retroreflective or internally illuminated raised pavement markers may be used in the
706 roadway immediately adjacent to curbed approach ends of raised medians and curbs of islands,
707 or on top of such curbs (see Section 3J.04).

708 **Standard:**

709 **When used, internally illuminated raised pavement markers shall be steadily**
710 **illuminated and shall not be flashed.**

711 Support:

712 Flashing raised pavement markers are considered to be In-Roadway Lights (see Chapter 4U).

713 *Guidance:*

714 *The spacing of raised pavement markers used to supplement or substitute for other types of*
715 *longitudinal markings should correspond with the pattern of broken lines for which the markers*
716 *supplement or substitute.*

717 **Standard:**

718 **The value of N cited in Sections 3B.14 through 3B.17 for the spacing of raised pavement**
719 **markers shall equal the length of one line segment plus one gap of the broken lines used on**
720 **the highway.**

721 Option:

722 For additional emphasis, retroreflective raised pavement markers may be spaced closer than
723 described in Sections 3B.14 through 3B.17, as determined by engineering judgment or
724 engineering study.

726 **Section 3B.15 Comments:** NCUTCD agrees with 3B.15 as presented in the NPA.

727 **Section 3B.15 Raised Pavement Markers as Vehicle Positioning Guides with Other**
728 **Longitudinal Markings**

729 Option:

730 Retroreflective or internally illuminated raised pavement markers may be used as positioning
731 guides with longitudinal line markings without necessarily conveying information to the road
732 user about passing or lane-use restrictions. In such applications, markers may be positioned in
733 line with or immediately adjacent to a single line marking, or positioned between the two lines of
734 a double center line or double lane line marking.

735 *Guidance:*

736 *Except as otherwise provided in Paragraphs 3 and 4, the spacing for such applications*
737 *should be 2N (see Section 3B.14).*

738 Option:

739 Where it is desired to alert the road user to changes in the travel path, such as on sharp curves
740 or on transitions that reduce the number of lanes or that shift traffic laterally, the spacing may be
741 reduced to N or less.

744 On freeways and expressways, the spacing may be increased to 3N for relatively straight and
745 level roadway segments where engineering judgment indicates that such spacing will provide
746 adequate delineation under wet night conditions.

749 **Section 3B.16 Comments:** NCUTCD agrees with 3B.16 as presented in the NPA.

750 **Section 3B.16 Raised Pavement Markers Supplementing Other Markings**

751 *Guidance:*

753 *The use of retroreflective or internally illuminated raised pavement markers for*
754 *supplementing longitudinal line markings should comply with the following:*

755 *A. Lateral Positioning*

756 *1. When supplementing double line markings, pairs of raised pavement markers placed*
757 *laterally in line with or immediately outside of the two lines should be used.*

758 *2. When supplementing wide line markings, pairs of raised pavement markers placed laterally*
759 *adjacent to each other should be used.*

760 *B. Longitudinal Spacing*

761 *1. When supplementing solid line markings, raised pavement markers at a spacing no greater*
762 *than N (see Section 3B.14) should be used, except that when supplementing channelizing lines or*
763 *edge line markings, a spacing of no greater than N/2 should be used.*

764 *2. When supplementing broken line markings, a spacing no greater than 3N should be used.*

765 *However, when supplementing broken line markings identifying reversible lanes, a spacing of no*
766 *greater than N should be used.*

767 *3. When supplementing dotted lane line markings, a spacing appropriate for the application*
768 *should be used.*

769 *4. When supplementing longitudinal line extension markings through at-grade intersections,*
770 *one raised pavement marker for each short line segment should be used.*

771 *5. When supplementing line extensions through freeway interchanges, a spacing of no greater*
772 *than N should be used.*

773 *Raised pavement markers should not supplement right-hand edge lines unless an engineering*
774 *study or engineering judgment indicates the benefits of enhanced delineation of a curve or other*
775 *location would outweigh possible impacts on bicycles using the shoulder, and the spacing of*
776 *raised pavement markers on the right-hand edge is close enough to minimize misinterpretation*
777 *as a broken line during wet night conditions.*

778 Option:

779 Raised pavement markers also may be used to supplement other markings such as
780 channelizing islands, gore areas, approaches to obstructions, or wrong-way arrows.

781 To improve the visibility of horizontal curves, center lines may be supplemented with
782 retroreflective or internally illuminated raised pavement markers for the entire curved section as
783 well as for a distance in advance of the curve that approximates 5 seconds of travel time.

786 **Section 3B.17 Comments:** NCUTCD agrees with 3B.17 as presented in the NPA.

787 **Section 3B.17 Raised Pavement Markers Substituting for Pavement Markings**

788 Option:

790 Retroreflective or internally illuminated raised pavement markers, or non-retroreflective
791 raised pavement markers supplemented by retroreflective or internally illuminated markers, may
792 be substituted for markings of other types.

793 *Guidance:*

794 *If used, the pattern of the raised pavement markers should simulate the pattern of the*
795 *markings for which they substitute.*

796 **Standard:**

797 **Non-retroreflective raised pavement markers shall not be used alone, without**
798 **supplemental retroreflective or internally illuminated markers, as a substitute for other**
799 **types of pavement markings.**

800 If raised pavement markers are used to substitute for broken line markings, a group of
801 three to five markers equally spaced at a distance no greater than $N/8$ (see Section 3B.14)
802 shall be used. If N is other than 40 feet, the markers shall be equally spaced over the line
803 segment length (at 1/2 points for three markers, at 1/3 points for four markers, and at 1/4
804 points for five markers). At least one retroreflective or internally illuminated marker per
805 group shall be used or a retroreflective or internally illuminated marker shall be installed
806 midway in each gap between successive groups of non-retroreflective markers.

807 When raised pavement markers substitute for solid line markings, the markers shall be
808 equally spaced at no greater than $N/4$, with retroreflective or internally illuminated units at
809 a spacing no greater than $N/2$.

810 *Guidance:*

811 *Raised pavement markers should not substitute for right-hand edge line markings unless an*
812 *engineering study or engineering judgment indicates the benefits of enhanced delineation of a*
813 *curve or other location would outweigh possible impacts on bicycles using the shoulder, and the*
814 *spacing of raised pavement markers on the right-hand edge line is close enough to minimize*
815 *misinterpretation as a broken line during wet night conditions.*

816 **Standard:**

817 When raised pavement markers substitute for dotted lines, they shall be spaced at no
818 greater than $N/4$, with not less than one raised pavement marker per dotted line segment.
819 At least one raised marker every N shall be retroreflective or internally illuminated.

820 *Option:*

821 When substituting for wide lines, raised pavement markers may be placed laterally adjacent
822 to each other to simulate the width of the line.

824 **Section 3B.18 Comments:** NCUTCD agrees with 3B.18 as presented in the NPA.

827 **Section 3B.18 Curb Markings for Parking Regulations**

828 *Guidance:*

829 *Except as provided in Paragraph 4, since yellow and white curb markings are frequently*
830 *used for curb delineation and visibility, parking regulations should be established through the*
831 *installation of standard signs (see Sections 2B.56 through 2B.57).*

832 Where curbs are marked to convey parking regulations in areas where curb markings are
833 frequently obscured by snow and ice accumulation, signs should be used with the curb markings
834 except as provided in Paragraph 4.

835 Except as provided in Paragraph 4, when curb markings are used without signs to convey
836 parking regulations, a legible word marking regarding the regulation (such as "No Parking" or
837 "No Standing") should be placed on the curb.

838 Option:

839 Curb markings without word markings or signs may be used to convey a general prohibition
840 by statute of parking within a specified distance of a STOP sign, YIELD sign, driveway, fire
841 hydrant, or crosswalk.

842 Local highway agencies may prescribe special colors for curb markings to supplement
843 standard signs for parking regulation.

845 **Section 3B.19 Comments:** NCUTCD agrees with 3B.19 as presented in the NPA.

846 **Section 3B.19 Stop and Yield Lines**

847 Option:

848 Stop lines may be used to indicate the point behind which vehicles are required to stop in
849 compliance with a STOP (R1-1) sign, a Stop Here For Pedestrians (R1-5b or R1-5c) sign, or
850 some other traffic control device that requires vehicles to stop, except YIELD signs that are not
851 associated with passive grade crossings.

852 **Standard:**

853 **Stop lines shall consist of solid white lines extending across approach lanes to indicate
854 the point at which the stop is intended or required to be made.**

855 Except as provided in Section 8C.03, stop lines shall not be used at locations where
856 drivers are required to yield in compliance with a YIELD (R1-2) sign, a Yield Here To
857 Pedestrians (R1-5 or R1-5a) sign or at locations on uncontrolled approaches where drivers
858 or bicyclists are required by State law to yield to pedestrians.

859 **Guidance:**

860 *Stop lines should be used to indicate the point behind which vehicles are required to stop in
861 compliance with a traffic control signal.*

862 *Stop lines at midblock signalized locations should be placed at least 40 feet in advance of the
863 nearest signal indication (see Section 4D.07).*

864 *Stop lines should be 12 to 24 inches wide.*

865 **Support:**

866 Section 4J.02 contains information regarding the use and application of stop lines in
867 conjunction with a pedestrian hybrid beacon.

868 **Standard:**

869 **If used, a yield line pavement marking shall not be installed without a Yield (R1-2) sign,
870 a Yield Here To Pedestrians (R1-5 or R1-5a) sign, a Bicycles Yield to Peds (R9-6) Sign (see
871 Figure 3B-16), or some other traffic control device that requires vehicles to yield.**

872 Yield lines shall not be used at locations where drivers are required to stop in
873 compliance with a STOP (R1-1) sign, a Stop Here For Pedestrians (R1-5b or R1-5c) sign, a
874 traffic control signal, or some other traffic control device.

875 Yield lines shall consist of a row of solid white isosceles triangles pointing toward
876 approaching vehicles extending across approach lanes to indicate the point at which the
877 yield is intended or required to be made.

878 **Guidance:**

881 The individual triangles comprising the yield line should have a base of 12 to 24 inches wide
882 and a height equal to 1.5 times the base. The space between the triangles should be 3 to 12
883 inches.

884 If used, stop and yield lines should be placed a minimum of 4 feet in advance of the nearest
885 crosswalk line at controlled intersections, except for yield lines at roundabouts as provided for
886 in Section 3D.04 and at midblock crosswalks. In the absence of a marked crosswalk, the stop
887 line or yield line should be placed at the desired stopping or yielding point, but should not be
888 placed more than 30 feet or less than 4 feet from the nearest edge of the intersecting traveled
889 way.

890 **Standard:**

891 **If yield (stop) lines are used at a crosswalk that crosses an uncontrolled multi-lane
892 approach, Yield Here To (Stop Here For) Pedestrians (R1-5 series) signs (see Section
893 2B.20) shall be used.**

894 **When used to supplement a Yield Here To (Stop Here For) Pedestrians (R1-5 series)
895 sign in advance of a crosswalk that crosses an uncontrolled multi-lane approach, the yield
896 (stop) line shall be placed 20 to 50 feet in advance of the nearest crosswalk line.**

897 **Guidance:**

898 *If yield or stop lines are used in advance of a crosswalk that crosses an uncontrolled multi-
899 lane approach, parking should be prohibited in the area between the yield or stop line and the
900 crosswalk (see Drawing B of Figure 3B-16).*

901 **Support:**

902 **Section 9B.12 contains information for providing signing applicable to bicycles also subject
903 to a yielding requirement at a crosswalk that crosses an uncontrolled approach.**

904 **Guidance:**

905 *Yield (stop) lines and Yield Here To (Stop Here For) Pedestrians signs should not be used in
906 advance of crosswalks that cross an approach to or departure from a circular intersection.*

907 **Support:**

908 Section 8C.03 contains information regarding the use of stop lines and yield lines at grade
909 crossings.

910 **Option:**

911 Stop and yield lines may be staggered longitudinally on a lane-by-lane basis (see Drawing D
912 of Figure 3B-13).

913 **Support:**

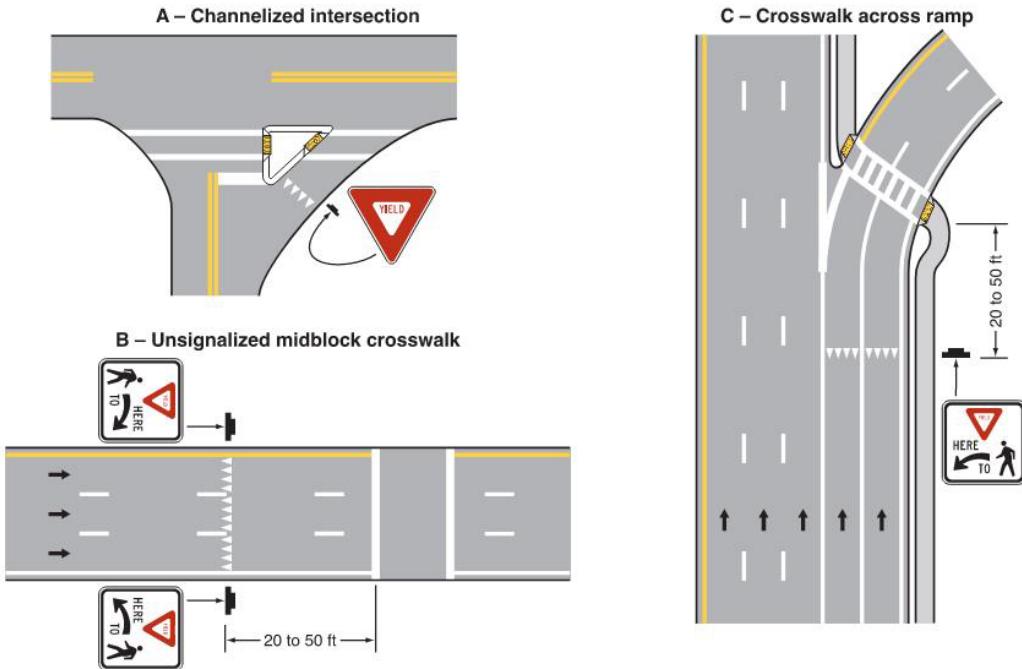
914 Staggered stop lines and staggered yield lines can improve the driver's view of pedestrians,
915 provide better sight distance for turning vehicles, and increase the turning radius for left-turning
916 vehicles.

917

918 **Figure 3B-16 Comments:** NCUTCD agrees with Figure 3B-16 as presented in the NPA.
919

Figure 3B-16. Examples of Yield Lines at Unsignalized Midblock Crosswalks

Figure 3B-16. Examples of Yield Line Applications



920
921
922
923 **Section 3B.20 Comments:** NCUTCD generally agrees with 3B.20 as presented in the NPA, but
924 recommends restoring wording from the 2009 MUTCD on marking color that appears to have
925 been erroneously deleted.

926 **Section 3B.20 Word, Symbol, and Arrow Pavement Markings – General 927 Option:**

928 Word, symbol, and arrow markings may be used as determined by engineering judgment to
929 supplement signs and/or to provide additional emphasis for regulatory, warning, or guidance
930 messages provided by other devices.

931 Support:

932 For arrow pavement markings in the vicinity of highway-rail grade crossings, see Section
933 8C.04.

934 Standard:

935 Word, symbol, and arrow pavement markings shall be white, except as otherwise
936 provided in this Section. [restore wording from 2009 MUTCD that appears to have been
937 erroneously deleted]

938 **Pavement marking letters, numerals, symbols, and arrows shall be installed in
939 accordance with the design details in the Pavement Markings chapter of the “Standard
940 Highway Signs and Markings” book (see Section 1A.05).**

941 Guidance:

942 Word, symbol and/or arrow markings that are grouped together to formulate one
943 interrelated message should not exceed three lines of information.

945 *Except for the two opposing white arrows of a two-way left-turn lane marking (see Figure*
946 *3B-7) and the pavement word marking messages described in Items B and D of Paragraph 2 of*
947 *Section 3B.26., the longitudinal space between word, symbol, and/or arrow markings that are*
948 *used together to formulate one interrelated message should be at least four times the height of*
949 *the characters for low speed roads, but not more than ten times the height of the characters*
950 *under any conditions. [editorial]*

951 *Except for the SCHOOL word marking (see Section 7C.02), pavement word, symbol, and*
952 *arrow markings should be no more than one lane in width.*

953 *Pavement word, symbol, and arrow markings should be proportionally scaled to fit within*
954 *the width of the facility upon which they are applied.*

955 **Option:**

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

958 *On roadways where the operating speed is less than 25 mph, word, symbol, and arrow*
959 *markings may be reduced in size to no less than $\frac{1}{4}$ size, but in relative proportion to the*
960 *associated full-size word, symbol, or arrow. [editorial]*

963 **Section 3B.21 Comments:** NCUTCD agrees with 3B.21 as presented in the NPA.

965 **Section 3B.21 Word Pavement Markings**

966 **Guidance:**

967 *Letters and numerals should be 6 feet or more in height except as provided in Section 9E.15*
968 *for a bicycle detector symbol.*

969 *If a pavement marking word message consists of more than one line of information, it should*
970 *read in the direction of travel. The first word of the message should be nearest to the road user.*

971 **Standard:**

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

974 **Guidance:**

975 *Where through lanes approaching an intersection become mandatory turn lanes, ONLY word*
976 *pavement markings (see Figure 3B-17) should be used in addition to the required lane-use arrow*
977 *markings (see Section 3B.23) and signs (see Sections 2B.29 and 2B.30).*

978 **Option:**

979 The ONLY word marking may be used to supplement the lane-use arrow markings in lanes
980 that are designated for the exclusive use of a single movement such as turn bays.

981 *The ONLY word marking may be used to supplement a preferential lane word or symbol*
982 *marking (see Section 3E.03).*

983 **Standard:**

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

987 **Figure 3B-17 Comments:** NCUTCD agrees with Figure 3B-17 as presented in the NPA.

988 **Figure 3B-17. Example of Elongated Letters for Word Pavement Markings**

Figure 3B-17. Example of Elongated Letters for Word Pavement Markings



989

990

991 **Section 3B.22 Comments:** NCUTCD agrees with 3B.22 as presented in the NPA.

992

993 **Section 3B.22 Symbol Pavement Markings**

994 Support:

995 Section 3E.03 contains information on the diamond shape symbol for high-occupancy
996 vehicle (HOV) lanes.

997 Chapter 9E contains information on symbol markings that can be used for bicycle lanes.

998 Option:

999 Pavement markings simulating Interstate, U.S., State, and other official highway route shield
1000 signs (see Figure 2D-5) with appropriate route numbers, but elongated for proper proportioning
1001 when viewed as a marking, may be used to guide road users to their destinations (see Figure 3B-
1002 18).

1003 Guidance:

1004 If route shield markings are provided to guide road users, those route shield markings should
1005 be provided in option lanes if markings are provided in any lanes.

1006 If two route shield markings are provided in an option lane, they should be placed together
1007 in sequence and not divided around an optional lane arrow.

1008 Support:

1009 Section 9E.14 contains information on route markers for designated bicycle routes that can
1010 be used on shared-use paths.

1011 Guidance:

1012 The International Symbol of Accessibility parking space marking (see Figure 3B-19) should
1013 be placed in each parking space designated for use by persons with disabilities.

1014 Option:

1015 A blue background with white border may supplement the wheelchair symbol as shown in
1016 Figure 3B-19.

1017 A yield-ahead triangle symbol or YIELD AHEAD word pavement marking may be used on
1018 approaches to intersections where the approaching traffic will encounter a YIELD sign at the
1019 intersection.

1020 **Standard:**

1021 The yield-ahead triangle symbol or YIELD AHEAD word pavement marking shall not
1022 be used unless a YIELD sign (see Section 2B.05) is in place at the intersection. The yield-
1023 ahead symbol marking shall be as shown in Figure 3B-20.

1025 **Figure 3B-18 Comments:** NCUTCD agrees with Figure 3B-18 as presented in the NPA.

1026 **Figure 3B-18. Examples of Elongated Route Shields for Pavement Markings**

1027 **Figure 3B-18. Examples of Elongated Route Shields and Markers Applied as Pavement Markings**

A - Interstate Shield
on dark or
light pavement

B - U.S. Route Shield
on dark pavement

C - U.S. Route Shield
on light pavement

D - State Route Marker
on dark pavement

E - State Route Marker
on light pavement



Note: See the "Standard Highway Signs and Markings" book for sizes and details

1028 **Figure 3B-19 Comments:** NCUTCD agrees with Figure 3B-19 as presented in the NPA.

1029 **Figure 3B-19. International Symbol of Accessibility Parking Space Marking**

1030 **Figure 3B-19. International Symbol of
Accessibility Parking Space Marking**



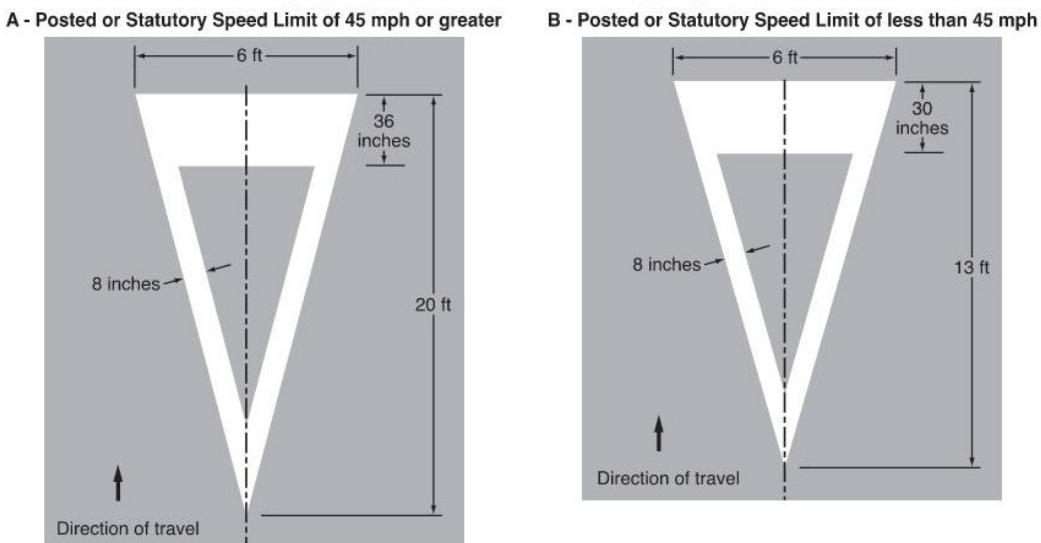
1031 Notes:

- 1032 1. See the "Standard Highway Signs and Markings"
book for sizes and details.
2. The blue-colored background is optional.

1033 **Figure 3B-20 Comments:** NCUTCD agrees with Figure 3B-20 as presented in the NPA.

1034 **Figure 3B-20. Yield Ahead Triangle Symbols**

Figure 3B-20. Yield Ahead Triangle Symbols



1035
1036 Option:
1037 A pedestrian symbol pavement marking may be used on portions of facilities such as shared-
1038 use paths that are reserved exclusively for pedestrian use.

1039
1040
1041 **Section 3B.23 Comments:** NCUTCD agrees with 3B.23 as presented in the NPA.

1042 **Section 3B.23 Lane-Use Arrows**

1043 Support:

1044 Lane-use arrow markings (see Figure 3B-21) are used to indicate the mandatory or
1045 permissible movements in certain lanes (see Figure 3B-22) and in two-way left-turn lanes (see
1046 Figure 3B-7).

1047 Section 8C.04 contains information about the placement of lane-use arrow markings in the
1048 vicinity of grade crossings.

1049 Guidance:

1050 Lane-use arrow markings should be used in lanes and turn bays designated for the exclusive
1051 use of a turning movement. Lane-use arrow markings should also be used in lanes from which
1052 movements are allowed that are contrary to the normal rules of the road (see Drawing B of
1053 Figure 3B-13).

1054 When used in turn lanes, at least two arrows should be used, one at or near the upstream end
1055 of the full-width turn lane and one an appropriate distance upstream from the stop line or
1056 intersection (see Drawing A of Figure 3B-11).

1057 Where opposing offset channelized left-turn lanes exist, lane-use arrow markings should be
1058 placed near the downstream terminus of the offset left-turn lanes to reduce wrong-way
1059 movements (see Figure 2B-11).

1060 Option:

1061 An additional arrow or arrows may be used in a turn lane. When arrows are used for a short
1062 turn lane, the second (downstream) arrow may be omitted based on engineering judgment.

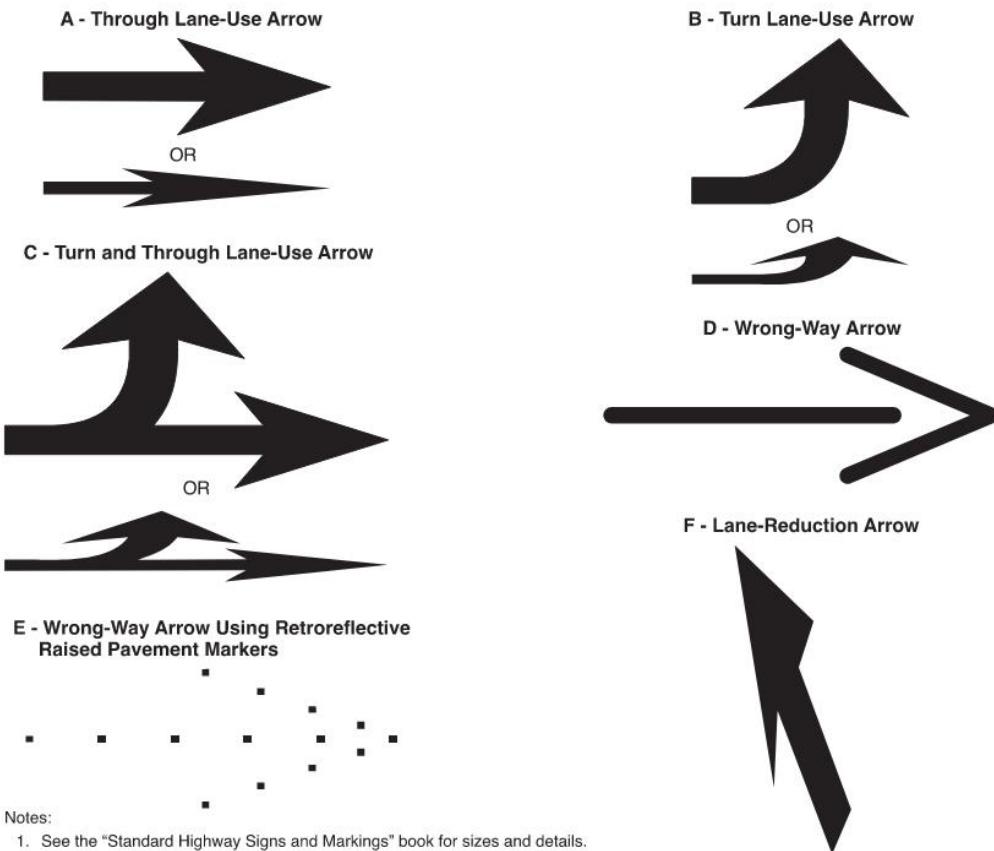
1064 Support:
1065 An arrow at the downstream end of a turn lane can help to prevent wrong way movements.
1066 **Standard:**
1067 **Where through lanes approaching an intersection become mandatory turn lanes, turn**
1068 **lane use arrow markings (see Drawing A of Figure 3B-11 and Figure 3B-21) shall be used**
1069 **and shall be accompanied by standard signs.**
1070 *Guidance:*
1071 *Where through lanes approaching an intersection become mandatory turn lanes, ONLY word*
1072 *markings (see Figure 3B-17) should be used in addition to the required turn lane-use arrow*
1073 *markings and signs (see Sections 2B.29 and 2B.30). These markings and signs should be placed*
1074 *well in advance of the turn and should be repeated as necessary to provide the through motorist*
1075 *advance notification to vacate the lane prior to reaching a point where roadway geometrics or a*
1076 *queue of waiting vehicles forces the motorist to make an unintended turn.*
1077 Option:
1078 On freeways or expressways where a through lane becomes a mandatory exit lane, lane-use
1079 arrow markings may be used on the approach to the exit in the dropped lane and in an adjacent
1080 optional through-or-exit lane if one exists.
1081

1082
1083

Figure 3B-21 Comments: NCUTCD agrees with Figure 3B-21 as presented in the NPA.

Figure 3B-21. Examples of Standard Arrows for Pavement Markings

Figure 3B-21. Examples of Standard Arrows for Pavement Markings



Notes:

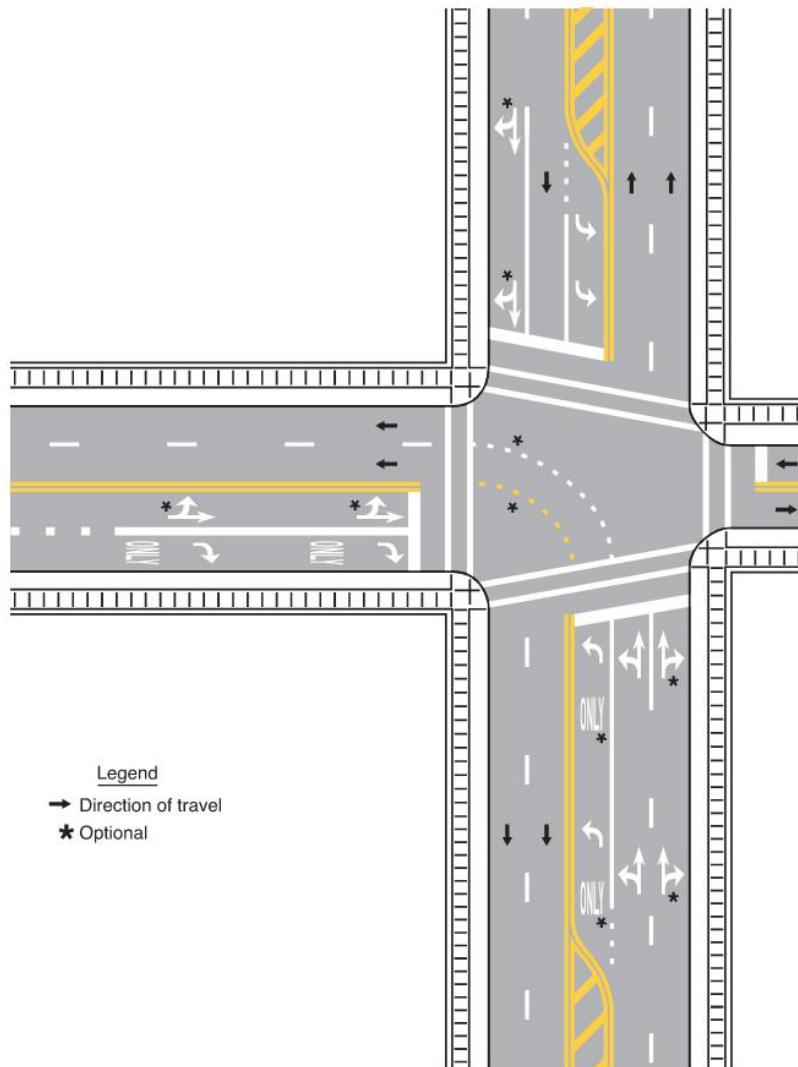
1. See the "Standard Highway Signs and Markings" book for sizes and details.
2. Sizes may be reduced approximately one-third for low-speed urban conditions; larger sizes may be needed for freeways, above average speeds, and other critical locations.

1084
1085

1086 **Figure 3B-22 Comments:** NCUTCD agrees with Figure 3B-22 as presented in the NPA.
1087

Figure 3B-22. Examples of Lane-Use Control Word and Arrow Pavement Markings

Figure 3B-22. Examples of Lane-Use Control Word and Arrow Pavement Markings



1088
1089
1090
1091 **Section 3B.24 Comments:** NCUTCD agrees with 3B.24 as presented in the NPA.
1092

1093 **Section 3B.24 Wrong-Way Arrows**

1094 *Guidance:*

1095 *Where crossroad channelization or ramp geometrics do not make wrong-way movements*
1096 *difficult, the appropriate lane-use arrow should be placed in each lane of an exit ramp near the*
1097 *crossroad terminal where it will be clearly visible to a potential wrong-way road user (see*
1098 *Figure 2B-12).*

1099 *Option:*

1100 *The wrong-way arrow markings shown in Drawing D in Figure 3B-21 may be placed near*
1101 *the downstream terminus of a ramp as shown in Figures 2B-12 and 2B-13A , or at other*

1102 locations where lane-use arrows are not appropriate, to indicate the correct direction of traffic
1103 flow and to discourage drivers from traveling in the wrong direction.

1104

1105

1106 **Section 3B.25 Comments:** NCUTCD recommends revising 3B.25 as follows:

- 1107 • Revise the first Guidance statement as an Option statement, because although chevron
1108 markings in some locations can show operational and safety benefits, resource and funding
1109 limitations may restrict an agency from the ability to consistently install and maintain these
1110 markings
- 1111 • Revise the first Guidance (recommended Option) statement to clarify and simplify wording
- 1112 • Delete the final paragraph in the first Guidance (recommended Option) statement, as it is
1113 unnecessary
- 1114 • Revise the first Standard statement to simplify the wording, as chevron markings will always
1115 be white as they are placed between traffic in the same direction
- 1116 • Revise the second Guidance statement as an Option for consistency within the Section
- 1117 • Delete the final paragraph in the second Guidance (recommended Option) statement, as it is
1118 unnecessary
- 1119 • Revise the second Option statement to delete redundant wording and consolidate material
- 1120 • Revise the second Standard statement to simplify the wording and consolidate material
- 1121 • Revise the third Guidance statement to simplify the wording and consolidate material
- 1122 • Revise the final Option statement to simplify the wording and consolidate material
- 1123 • Revise figure references as needed throughout the Section

1124

1125 **Section 3B.25 Chevron and Diagonal Markings**

1126 Support:

1127 Chevron or diagonal markings are used to discourage travel on certain paved areas, such as
1128 shoulders, neutral areas, and flush median areas.

1129 **Guidance:** Option:

1130 Chevron and diagonal markings ~~should~~ may be used:

1131 A. On approaches to obstructions in the roadway (see [Sheet 2 of Figure Section 3B-13](#)),

1132 or

1133 B. For channelized travel paths on approaches to intersections (see [Figure 2B-12](#)), or

1134 C. In buffer spaces between preferential lanes and general-purpose lanes (see Drawing A of
1135 Figure 3E-2), or

1136 D. In the neutral area of ~~exit ramp and entrance ramp~~ gores (see Figures 3B-8, [Drawing A](#)
1137 of Figure 3B-9, and Figure through 3B-10), or

1138 E. In the neutral area of bifurcations created from open-road tolling lanes that bypass a
1139 conventional toll plaza, or

1140 F. In neutral areas, ~~where used~~, at access and egress points to and from a managed-lane
1141 facility (see Figures 2G-9, 2G-10, 2G-22, [and 2G-23, and 2G-25](#)) and,

1142 G. In neutral areas of islands (see [Figures 3J-1 through 3J-3](#)).

1143 **Option:**

1144 Chevron markings may be supplemented with white retroreflective or internally illuminated
1145 raised pavement markers (see Sections 3B-15 and 3B.17) for enhanced nighttime visibility.

1146 ~~Chevron markings may be used at other locations for special emphasis where traffic flows in~~
1147 ~~the same general direction as determined by engineering judgment.~~

1148 Standard:

1149 ~~When e~~Chevron markings ~~are used in paved areas that separate traffic flows in the~~
1150 ~~same general direction they~~ shall be white, with the point of each chevron facing toward
1151 approaching traffic, as shown in Figures 3B-8, Drawing A of Figure 3B-9, Figure through
1152 3B-10, ~~and~~ Drawing C of Figure 3B-15 ~~and Figures 3J-1 through 3J-3.~~

1153 Guidance Option:

1154 *Diagonal markings for opposing directions of traffic* ~~should~~ may be used:

1155 A. *On approaches to obstructions in the roadway* (see Drawings A and B of Figure 3B-15),
1156 or

1157 B. *In flush medians* ~~areas~~ *between double solid yellow center line markings* (see Figure 3B-
1158 5), or

1159 C. *In buffer spaces between preferential lanes and general-purpose lanes* (see Drawing D of
1160 Figure 3E-4).

1161 Option:

1162 Diagonal markings may be used on paved shoulders ~~on paved shoulders~~ or in no-parking
1163 zones, ~~or other locations for special emphasis.~~

1164 ~~Diagonal markings may be used at other locations for special emphasis where traffic flows in~~
1165 ~~the opposite direction as determined by engineering judgment.~~

1166 Standard:

1167 When diagonal markings are used ~~in paved areas that separate between~~ opposing
1168 directions of traffic ~~or on the left shoulder of a one-way or divided roadway,~~ they shall be
1169 yellow ~~diagonal markings that~~ ~~and~~ slant away from traffic in the adjacent travel lanes, as
1170 shown in Figures 3B-2, ~~and~~ 3B-5 and Drawings A and B of Figure 3B-15.

1171 When diagonal markings are used on ~~paved the right~~ shoulders or in ~~on-street~~ no-
1172 parking zones (see Figure 3B-24), they shall be ~~white and diagonal markings that~~ slant
1173 away from traffic in the adjacent travel lane. ~~The diagonal markings shall be yellow when~~
1174 ~~used on the left-hand shoulders of the roadways of divided highways and on the left-hand~~
1175 ~~shoulders of one-way streets or ramps. The diagonal markings shall be white when used on~~
1176 ~~right-hand shoulders.~~

1177 Guidance:

1178 Except as provided in Paragraph ~~13XX~~, ~~the lines used for~~ chevrons and diagonal markings
1179 should be at least 12 inches wide for roadways having a speed limit of 45 mph or greater, ~~and~~ at
1180 least 8 inches wide for roadways having speed limit of less than 45 mph ~~to 25 mph, and at least 4~~
1181 ~~inches wide on roadways where the operating speed is less than 25 mph.~~ The longitudinal
1182 spacing of the chevrons or diagonal lines should be determined by engineering judgment
1183 considering factors such as speeds and desired visual impacts. The chevrons and diagonal lines
1184 should form an angle of approximately 30 to 45 degrees with the longitudinal lines that they
1185 intersect.

1186 ~~Diagonal markings used in on-street no-parking zones should be white.~~

1187 Option:

1188 ~~The lines used for~~ ~~d~~Diagonal markings used in no-parking zones ~~or on roadways with~~
1189 ~~operating speeds of less than 25 mph~~ may be 4 inches wide (see Figure 3B-24).

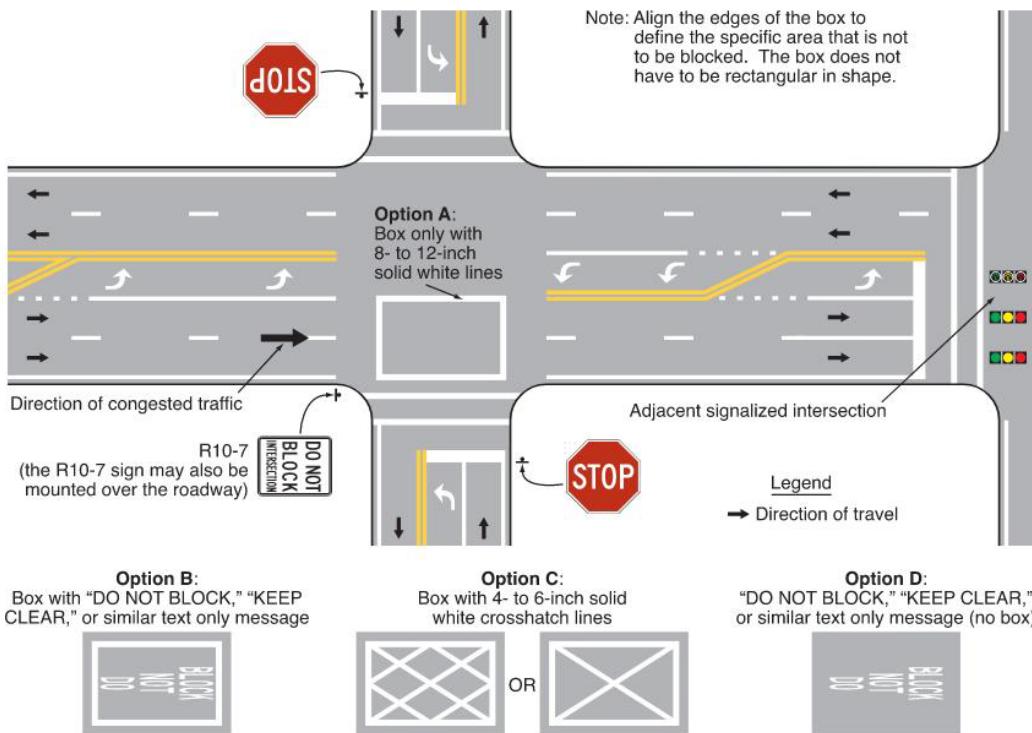
1191
1192 **Section 3B.26 Comments:** NCUTCD agrees with 3B.26 as presented in the NPA.
1193
1194 **Section 3B.26 Do Not Block Intersection Markings**
1195 Option:
1196 Do Not Block Intersection markings may be used to mark the edges of an intersection area
1197 that is in close proximity to a signalized intersection, railroad crossing, or other nearby traffic
1198 control that might cause vehicles to stop within the intersection and impede other traffic entering
1199 the intersection. If authorized by law, Do Not Block Intersection markings with appropriate
1200 signs may also be used at other locations.
1201 **Standard:**
1202 **If used, Do Not Block Intersection markings (see Figure 3B-23) shall consist of one of**
1203 **the following alternatives:**
1204 A. Wide solid white lines that outline the intersection area that vehicles must not block;
1205 B. Wide solid white lines that outline the intersection area that vehicles must not block
1206 **and a white word message such as DO NOT BLOCK or KEEP CLEAR;**
1207 C. Wide solid white lines that outline the intersection area that vehicles must not block
1208 **and white cross-hatching within the intersection area; or**
1209 D. A white word message, such as DO NOT BLOCK or KEEP CLEAR, within the
1210 intersection area that vehicles must not block.
1211 **Do Not Block Intersection markings shall be accompanied by one or more DO NOT**
1212 **BLOCK INTERSECTION (DRIVEWAY) (CROSSING) (R10-7) signs (see Section 2B.63),**
1213 **one or more DO NOT STOP ON TRACKS (R8-8) signs (see Section 8B.07), or one or more**
1214 **similar signs.**

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Figure 3B-23 Comments: NCUTCD agrees with Figure 3B-23 as presented in the NPA.

Figure 3B-23. Do Not Block Intersection Markings

Figure 3B-23. Do Not Block Intersection Markings



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Section 3B.27 Comments: NCUTCD agrees with 3B.27 as presented in the NPA.

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Section 3B.27 Parking Space Markings

Standard:

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On-street parking space markings shall be white.

1228

Support: Examples of on-street parking space markings are shown in Figure 3B-24.

1229

Option:

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Blue lines may supplement white parking space markings of each parking space designated for use only by persons with disabilities (see Figure 3B-24).

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Support:

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Additional parking space markings for the purpose of designating spaces for use only by persons with disabilities are discussed in Section 3B.22 and illustrated in Figure 3B-19.

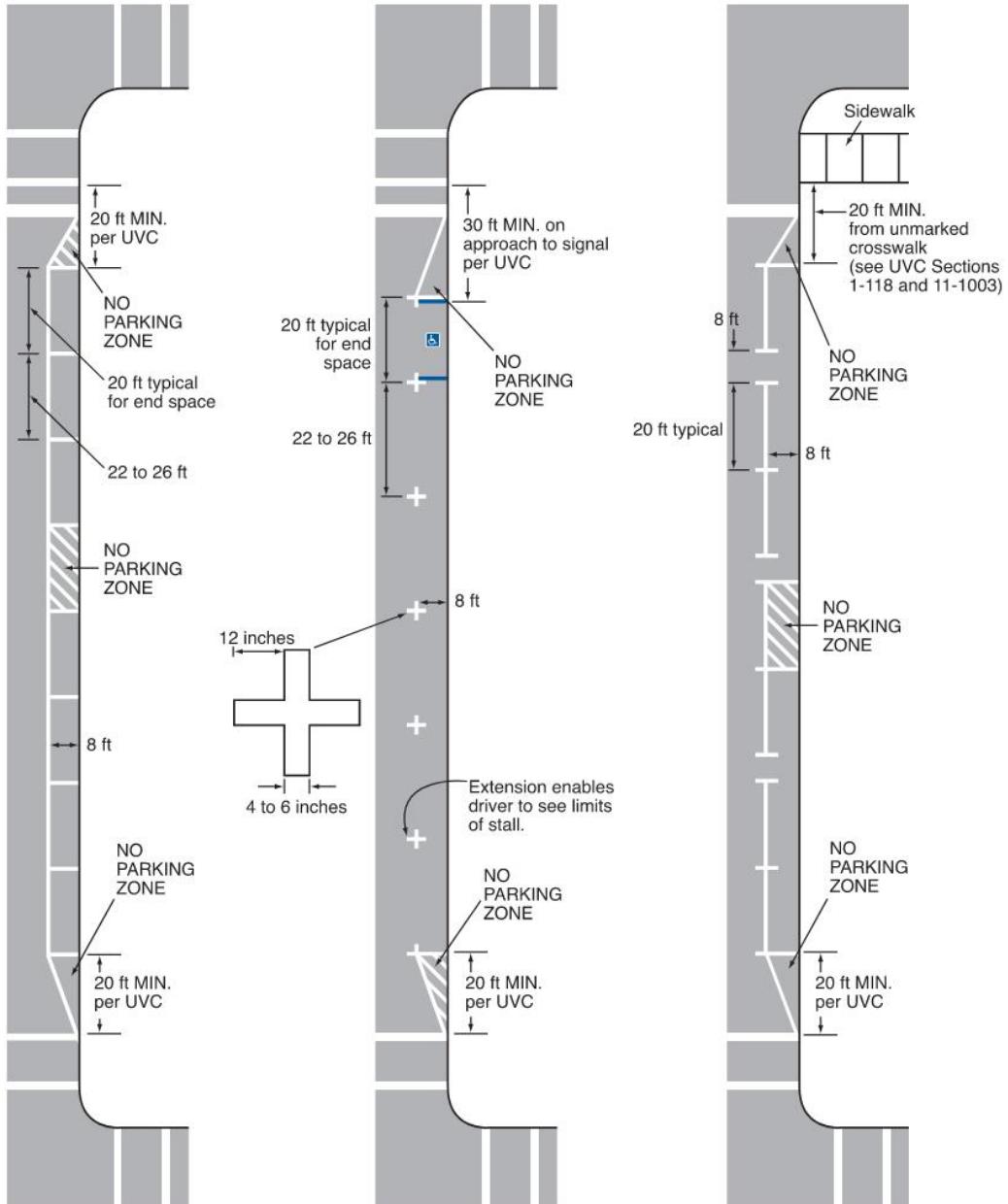
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Figure 3B-24 Comments: NCUTCD agrees with Figure 3B-24 as presented in the NPA.

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Figure 3B-24. Examples of Parking Space Markings

Figure 3B-24. Examples of Parking Space Markings



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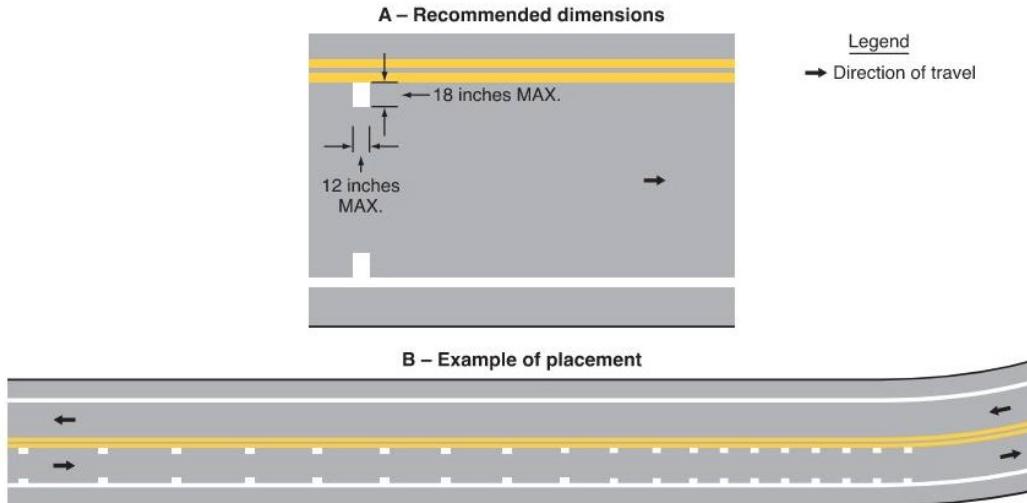
1247
1248 **Section 3B.28 Comments:** NCUTCD agrees with 3B.28 as presented in the NPA.
1249
1250 **Section 3B.28 Speed Reduction Markings**
1251 Support:
1252 Speed reduction markings (see Figure 3B-25) are transverse markings that are placed on the
1253 roadway within a lane (along both edges of the lane) in a pattern of progressively reduced
1254 spacing to give drivers the impression that their speed is increasing. These markings might be
1255 placed in advance of an unexpectedly severe horizontal or vertical curve or other roadway
1256 feature where drivers need to decelerate prior to reaching the feature and where the desired
1257 reduction in speeds has not been achieved by the installation of warning signs and/or other traffic
1258 control devices.
1259 Speed Reduction Markings have been shown to enhance safety around curves and locations
1260 with a history of run off the road crashes when applied in combination with horizontal alignment
1261 warning signs (See Section 2C.05).
1262 **Guidance:**
1263 *If used, speed reduction markings should be reserved for unexpected curves and should not*
1264 *be used on long tangent sections of roadway or in areas frequented mainly by local or familiar*
1265 *drivers, (e.g., school zones). If used, speed reduction markings should supplement the*
1266 *appropriate warning signs and other traffic control devices and should not substitute for these*
1267 *devices.*
1268 **Standard:**
1269 **Speed reduction markings shall be a series of white transverse lines on both sides of the**
1270 **lane that are perpendicular to the center line, edge line, or lane line.**
1271 **Guidance:**
1272 The longitudinal spacing between the markings should be progressively reduced from the
1273 upstream to the downstream end of the marked portion of the lane.
1274 *Speed reduction markings should not be greater than 12 inches in width, and should not*
1275 *extend more than 18 inches into the lane.*
1276 **Standard:**
1277 **Speed reduction markings shall be used only in lanes that have a longitudinal line**
1278 **(center line, edge line, or lane line) on both sides of the lane.**
1279
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Figure 3B-25 Comments: NCUTCD agrees with Figure 3B-25 as presented in the NPA.

Figure 3B-25. Example of the Application of Speed Reduction Markings

Figure 3B-25. Example of the Application of Speed Reduction Markings



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1287 **Section 3B.29 Comments:** NCUTCD generally agrees with 3B.29 as presented in the NPA, but
1288 recommends adding “speed table” in the Section title and second Standard statement.

1289

1290 Section 3B.29 Speed Hump and Speed Table Markings

1291 Standard:

1292 If speed hump markings are used, they shall be a series of white markings placed on a
1293 speed hump to identify its location. If markings are used for a speed hump that does not
1294 also function as a crosswalk or speed table, the markings shall comply with Option A, B, or
1295 C shown in Figure 3B-26. If markings are used for a speed hump that also functions as a
1296 crosswalk or speed table, the markings shall comply with Option A or B shown in Figure
1297 3B-27.

1298 **Option:**

1299 Where used, center line markings, lane line markings, and edge lines may be discontinued on
1300 the profile of the speed hump.

1301 Standard:

1302 **Where a speed hump or a speed table specifically incorporates a crossing movement for
1303 pedestrians, bicycles, equestrians, etc. and functions as a raised crosswalk, crosswalk
1304 markings (see Chapter 3C) shall be provided.**

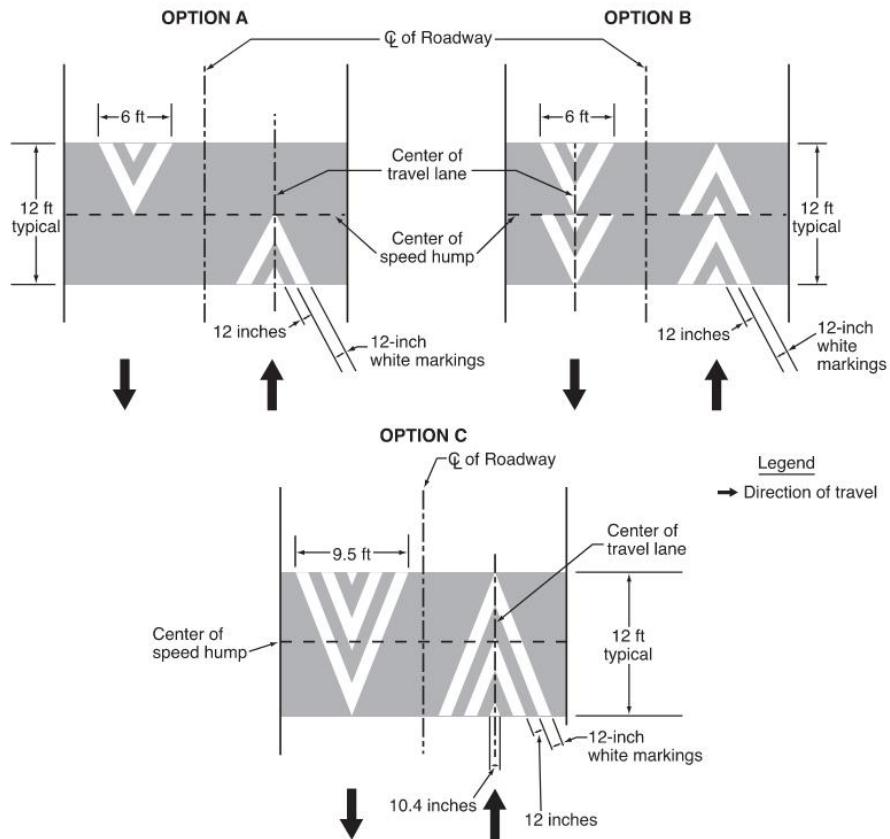
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Figure 3B-26 Comments: NCUTCD agrees with Figure 3B-26 as presented in the NPA.

Figure 3B-26. Pavement Markings for Speed Humps without Crosswalks

Figure 3B-26. Pavement Markings for Speed Humps without Crosswalks

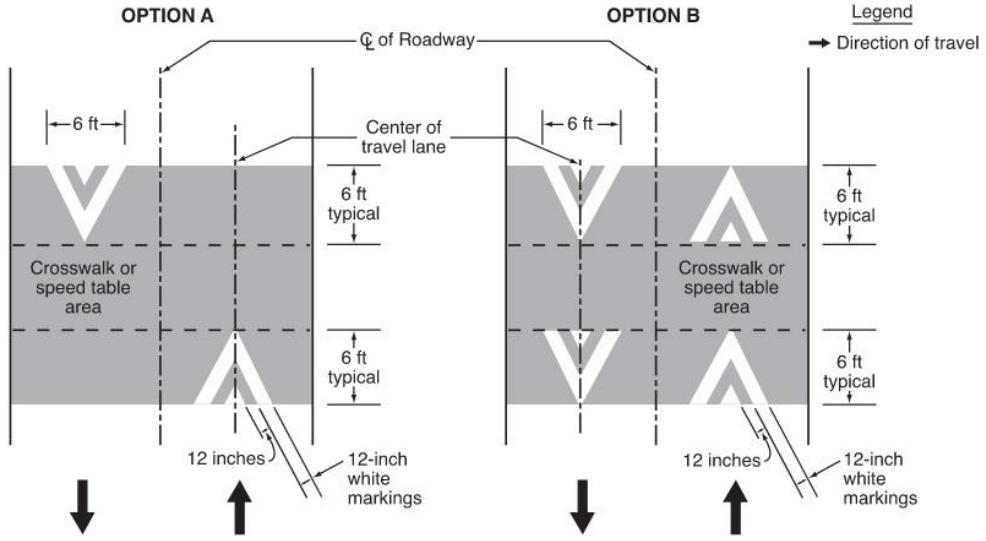


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Figure 3B-27 Comments: NCUTCD agrees with Figure 3B-27 as presented in the NPA.

Figure 3B-27. Pavement Markings for Speed Tables or Speed Humps with Crosswalks

Figure 3B-27. Pavement Markings for Speed Tables or Speed Humps with Crosswalks



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1314 **Section 3B.30 Comments:** NCUTCD agrees with 3B.30 as presented in the NPA.

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1316 **Section 3B.30 Advance Speed Hump Markings**

1317 Option:

1318 Advance speed hump markings (see Figure 3B-28) may be used in advance of speed humps
1319 or other engineered vertical roadway deflections such as dips where added visibility is desired or
1320 where such deflection is not expected.

1321 Advance word pavement markings such as BUMP or HUMP (see Section 3B.20) may be
1322 used on the approach to a speed hump either alone or in conjunction with advance speed hump
1323 markings.

1324 Appropriate advance warning signs may be used in compliance with Section 2C.28.

1325 **Standard:**

1326 **If advance speed hump markings are used, they shall be a series of eight white 12-inch
1327 transverse lines that become longer and are spaced closer together as the vehicle
1328 approaches the speed hump or other deflection. If advance markings are used, they shall
1329 comply with the detailed design shown in Figure 3B-28.**

1330 Guidance:

1331 If used, advance speed hump markings should be installed in each approach lane.

1332

1333 **Figure 3B-28 Comments:** Figure 3B-28 was missing from the NPA, therefore NCUTCD could
1334 not provide comments regarding this figure. NCUTCD recommends adding the figure.

1335 **Figure 3B-28. Advance Warning Markings for Speed Humps**

1336

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1338 **Section 3B.31 Comments:** NCUTCD generally agrees with 3B.31 as presented in the NPA, but
1339 recommends changing the term “Diamond Interchange with Transposed Alignment Crossroad”
1340 to the commonly-used “Diverging Diamond Interchange”.

1341

1342 **Section 3B.31 Markings for Diverging Diamond Interchange with Transposed Alignment**
1343 **Crossroad**

1344 **Support:**

1345 Markings used in a diverging diamond interchange with transposed alignment crossroad can
1346 be advantageous for minimizing wrong-way movements. The potential for wrong-way
1347 movements is greatest at the intersections where the alignment becomes transposed.

1348 **Standard:**

1349 On the transposed alignment, each direction shall be considered a one-way roadway
1350 whereas the edge line convention shall be in accordance with Section 3B.09. Both yellow
1351 and white edge lines shall be used.

1352 A lane-use arrow (see Section 3B.23) shall be used in each approach lane at the crossing
1353 point.

1354 **Support:**

1355 Section 3C.11 contains information on crosswalks and pedestrian movements for diverging
1356 diamond interchanges with a transposed alignment crossroad.

1357 **Standard:**

1358 **Flush median islands (see Section 3J.03) shall not be used to divide the inverted flow of**
1359 **traffic.**

1360 *Guidance:*

1361 *Edge line and lane lines extensions (see Section 3B.11) should be provided through the*
1362 *crossing points.*

1363 *Support:*

1364 *Figure 3B-29 illustrates an example of pavement markings for a diverging diamond*
1365 *interchange with a transposed alignment crossroad.*

1366
1367 **Figure 3B-29 Comments:** Figure 3B-29 was missing from the NPA, therefore NCUTCD could
1368 not provide comments regarding this figure. NCUTCD recommends adding the figure and
1369 changing the figure title to be consistent with NCUTCD-recommended changes for Section
1370 3B.31.

1371 **Figure 3B-29. Example of Pavement Markings for a Diverging Diamond Interchange**
1372 **with a Transposed Alignment Crossroad**