



National Committee on Uniform Traffic Control Devices

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

6 **Federal Register Item Number:** 510, 511, 512, 513, 514

7 **NPA MUTCD Section Number:** Sections 6N.01 to 6N.19

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: [\[Note that explains purpose of recommended change.\]](#)

15 The following pages present NCUTCD recommendations for changes to the MUTCD NPA
16 proposed text, tables, and figures for Chapter 6N. 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 #N/A, Section 6N.01: Changes recommended based on Council action in spring 2021
- 20 • NPA #N/A, Section 6N.02: NCUTCD agrees with NPA content (no changes recommended)
- 21 • NPA #N/A, Section 6N.03: NCUTCD agrees with NPA content (no changes recommended)
- 22 • NPA #510, Section 6N.04: Changes recommended based on Council action in spring 2021
- 23 • NPA #511, Section 6N.05: Changes recommended based on Council action in spring 2021
- 24 • NPA #N/A, Section 6N.06: Changes recommended based on Council action in spring 2021
- 25 • NPA #N/A, Section 6N.07: NCUTCD agrees with NPA content (no changes recommended)
- 26 • NPA #N/A, Section 6N.08: NCUTCD agrees with NPA content (no changes recommended)
- 27 • NPA #N/A, Section 6N.09: NCUTCD agrees with NPA content (no changes recommended)
- 28 • NPA #N/A, Section 6N.10: NCUTCD agrees with NPA content (no changes recommended)
- 29 • NPA #N/A, Section 6N.11: NCUTCD agrees with NPA content (no changes recommended)
- 30 • NPA #N/A, Section 6N.12: Changes recommended based on Council action in spring 2021
- 31 • NPA #512, Section 6N.13: Changes recommended based on Council action in spring 2021
- 32 • NPA #513, Section 6N.14: Changes recommended based on Council action in spring 2021
- 33 • NPA #N/A, Section 6N.15: NCUTCD agrees with NPA content (no changes recommended)
- 34 • NPA #N/A, Section 6N.16: NCUTCD agrees with NPA content (no changes recommended)
- 35 • NPA #N/A, Section 6N.17: NCUTCD agrees with NPA content (no changes recommended)
- 36 • NPA #N/A, Section 6N.18: NCUTCD agrees with NPA content (no changes recommended)
- 37 • NPA #514, Section 6N.19: Changes recommended based on Council action in spring 2021

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CHAPTER 6N. TYPE OF TEMPORARY TRAFFIC CONTROL ZONE ACTIVITIES

42 **Section 6N.01 Comments:** NCUTCD generally agrees with 6N.01 as presented in the NPA, but
43 recommends revising as follows:

- 44 • Revise the first Guidance statement to Standard, since definitions by default are Standards
- 45 • Add references to positive protection in accordance with NCUTCD recommendation 19B-
46 TTC-02 (4 locations)
- 47 • Revise section number references
- 48 • Revise a portion of the Support at the end of the section referencing rolling roadblocks to
49 Standard, with clarifying edits for emergency situations

51 **Section 6N.01 Work Duration**

52 Support:

53 Work duration is a major factor in determining the number and types of devices used in TTC
54 zones. The duration of a TTC zone is defined relative to the length of time a work operation
55 occupies a spot location.

56 Guidance Standard

57 **The five categories of work duration and their time at a location ~~should~~ shall be defined**
58 **as follows:**

- 59 **A. Long-term stationary is work that occupies a location more than 3 days.**
- 60 **B. Intermediate-term stationary is work that occupies a location more than one**
61 **daylight period up to 3 days, or nighttime work lasting more than 1 hour.**
- 62 **C. Short-term stationary is daytime work that occupies a location for more than 1 hour**
63 **within a single daylight period.**
- 64 **D. Short duration is work that occupies a location up to 1 hour.**
- 65 **E. Mobile is work that moves intermittently or continuously. [restore to a Standard]**

66 Support:

67 At long-term stationary TTC zones, there is ample time to install and realize benefits from the
68 full range of TTC procedures and devices that are available for use. Generally, larger
69 channelizing devices, temporary roadways, ~~and~~ temporary traffic barriers, and positive
70 protection devices are used. [revise per 19B-TTC-02]

71 **Standard:**

72 **Since long-term operations extend into nighttime, retroreflective and/or illuminated**
73 **devices shall be used in long-term stationary TTC zones.**

74 *Guidance:*

75 *Temporary markings should be installed in accordance with Section 6J.0~~1~~02.* [edit Section
76 number]

77 Support:

78 In intermediate-term stationary TTC zones, it might not be feasible or practical to use
79 procedures or devices that would be desirable for long-term stationary TTC zones, such as
80 altered pavement markings, temporary traffic barriers, ~~and~~ temporary roadways, and positive
81 protection devices. The increased time to place and remove these devices in some cases could
82 significantly lengthen the project, thus increasing exposure time. [revise per 19B-TTC-02]

83 **Standard:**

84 **Since intermediate-term operations extend into nighttime, retroreflective and/or**
85 **illuminated devices shall be used in intermediate-term stationary TTC zones.**

86 Support:

87 Most maintenance and utility operations are short-term stationary work.

88 As compared to stationary operations, mobile and short-duration operations are activities that
89 might involve different treatments. Devices having greater mobility might be necessary such as
90 signs mounted on trucks. Devices that are larger, more imposing, or more visible can be used
91 effectively and economically. The mobility of the TTC zone is important.

92 *Guidance:*

93 *Safety in short-duration or mobile operations should not be compromised by using fewer*
94 *devices simply because the operation will frequently change its location.*

95 Option:

96 Positive protection devices may be used in short duration or mobile operations when the
97 provisions in Section 6F.84a6M.02, paragraph 040203 exist. [revise per 19B-TTC-02]

98 Support:

99 During short-duration work, it often takes longer to set up and remove the TTC zone than to
100 perform the work. Workers face hazards in setting up and taking down the TTC zone. Also,
101 since the work time is short, delays affecting road users are significantly increased when
102 additional devices are installed and removed.

103 Option:

104 Considering these factors, simplified control procedures may be warranted for short-duration
105 work. A reduction in the number of devices may be offset by the use of positive protection
106 devices or other more dominant devices such as high-intensity rotating, flashing, oscillating, or
107 strobe lights on work vehicles. [revise per 19B-TTC-02]

108 Support:

109 Mobile operations often involve frequent short stops for activities such as litter cleanup,
110 pothole patching, or utility operations, and are similar to short-duration operations.

111 Option:

112 Flags and/or channelizing devices may additionally be used and moved periodically to keep
113 them near the mobile work area.

114 Flaggers may be used for mobile operations that often involve frequent short stops.

115 Support:

116 Mobile operations also include work activities where workers and equipment move along the
117 road without stopping, usually at slow speeds. The advance warning area moves with the work
118 area.

119 *Guidance:*

120 *When mobile operations are being performed, a shadow vehicle equipped with an arrow*
121 *board or a sign should follow the work vehicle, especially when vehicular traffic speeds or*
122 *volumes are high. Where feasible, warning signs should be placed along the roadway and*
123 *moved periodically as work progresses.*

124 *Under high-volume conditions, consideration should be given to scheduling mobile*
125 *operations work during off-peak hours.*

126 *If there are mobile operations on a high-speed travel lane of a multi-lane divided highway,*
127 *arrow boards should be used.*

128 **Standard:**

129 **Mobile operations shall have appropriate devices on the equipment (that is, high-**
130 **intensity rotating, flashing, oscillating, or strobe lights, signs, or special lighting), or shall**
131 **use a separate vehicle with appropriate warning devices. Although vehicle hazard warning**
132 **lights are permitted to be used to supplement high-intensity rotating, flashing, oscillating,**
133 **or strobe lights, they shall not be used instead of these devices.**

134 Option:

135 For mobile operations that move at speeds of less than 3 mph, mobile signs or stationary
136 signing that is periodically retrieved and repositioned in the advance warning area may be used.

137 Support:

138 A rolling roadblock is a method of temporary traffic control used to slow or stop traffic as a
139 means of temporarily removing traffic from a roadway [segment downstream of the roadblock](#).

140 The rolling roadblock closes all lanes of traffic by using pacing vehicles to create a gap so that
141 construction activities can be performed. Rolling roadblocks are used where long-term road

142 closures using temporary traffic control devices (TTCD) are not needed. ~~A rolling roadblock~~
143 ~~requires one blocking/pacing vehicle per lane of traffic, a clearing vehicle, and an advance~~

144 ~~warning vehicle. The rolling roadblock is normally performed by law enforcement officers~~

145 ~~during off-peak hours.~~ [change and edit this portion of the new Support to a Standard below and
146 edits for clarity]

147 Standard:

148 Except in emergency situations, a rolling roadblock shall consist of one blocking/pacing
149 vehicle per lane of traffic, a clearing vehicle, and an advance warning vehicle. [change this

150 portion of the above new Support to a Standard with clarifying edits]

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153 **Section 6N.02 Comments:** NCUTCD agrees with 6N.02 as presented in the NPA.

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155 **Section 6N.02 Location of Work**

156 Support:

157 Chapter 6C and Sections 6M.04 and 6N.04 contain additional information regarding the steps
158 to follow when pedestrian or bicycle facilities are affected by the worksite.

159 The choice of TTC needed for a TTC zone depends upon where the work is located. As a
160 general rule, the closer the work is to road users (including bicyclists and pedestrians), the

161 greater the number of TTC devices that are needed. Procedures are described later in this
162 Chapter for establishing TTC zones in the following locations:

- 163 A. Outside the shoulder,
- 164 B. On the shoulder with no encroachment,
- 165 C. On the shoulder with minor encroachment,
- 166 D. Within the median, and
- 167 E. Within the traveled way.

168 Standard:

169 **When the work space is within the traveled way, except for short-duration and mobile**
170 **operations, advance warning shall provide a general message that work is taking place and**
171 **shall supply information about highway conditions. TTC devices shall clearly delineate the**
172 **path roadway users are to follow through the TTC zone.**

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175 **Section 6N.03 Comments:** NCUTCD agrees with 6N.03 as presented in the NPA.

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177 **Section 6N.03 Modifications To Fulfill Special Needs**

178 Support:

179 The typical applications in Chapter 6P illustrate commonly encountered situations in which
180 TTC devices are employed.

181 Option:

182 Other devices may be added to supplement the devices provided in the typical applications,
183 and device spacing may be adjusted to provide additional reaction time. When conditions are
184 less complex than those depicted in the typical applications, fewer devices may be needed.

185 *Guidance:*

186 *When conditions are more complex, typical applications should be modified by giving*
187 *particular attention to the provisions set forth in Chapter 6A and by incorporating appropriate*
188 *devices and practices from the following list:*

189 A. *Additional devices:*

- 190 1. *Signs*
- 191 2. *Arrow boards*
- 192 3. *More channelizing devices at closer spacing (see Section 6M.04 for information*
193 *regarding detectable edging for pedestrians)*
- 194 4. *Temporary raised pavement markers*
- 195 5. *High-level warning devices*
- 196 6. *Portable changeable message signs*
- 197 7. *Temporary traffic control signals (including pedestrian signals and accessible*
198 *pedestrian signals)*
- 199 8. *Temporary traffic barriers*
- 200 9. *Crash cushions*
- 201 10. *Screens*
- 202 11. *Rumble strips*
- 203 12. *More delineation*

204 B. *Upgrading of devices:*

- 205 1. *A full complement of standard pavement markings*
- 206 2. *Brighter and/or wider pavement markings*
- 207 3. *Larger and/or brighter signs*
- 208 4. *Channelizing devices with greater conspicuity*
- 209 5. *Temporary traffic barriers in place of channelizing devices*

210 C. *Improved geometrics at detours or crossovers*

211 D. *Increased distances:*

- 212 1. *Longer advance warning area*
- 213 2. *Longer tapers*

214 E. *Lighting:*

- 215 1. *Temporary roadway lighting*
- 216 2. *Steady-burn lights used with channelizing devices*
- 217 3. *Flashing lights for isolated hazards*
- 218 4. *Illuminated signs*
- 219 5. *Floodlights*

220 F. *Pedestrian routes and temporary facilities*

221 G. *Bicycle diversions and temporary facilities*

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224 **Section 6N.04 Comments:** NCUTCD generally agrees with 6N.04 as presented in the NPA, but
225 recommends revising as follows:

- 226 • Delete a portion of the first Guidance statement referencing SHOULDER WORK signs and
227 channelizing devices in accordance with NCUTCD recommendation 20B-TTC-03
- 228 • Add and revise section references as appropriate

230 **Section 6N.04 Work Affecting Pedestrian and Bicycle Facilities**

231 Support:

232 It is not uncommon, particularly in urban areas, that road work and the associated TTC will
233 affect existing pedestrian or bicycle facilities. It is essential that the needs of all road users,
234 including pedestrians with disabilities, are considered in TTC zones.

235 In addition to specific provisions identified in Sections 6N.05 through 6N.13, there are a
236 number of provisions that might be applicable for all of the types of activities identified in this
237 Chapter.

238 *Guidance:*

239 *Where pedestrian or bicycle usage is high, the typical applications should be modified by*
240 *giving particular attention to the provisions set forth in Chapter 6C, this Chapter, Section 6K.02*
241 *and Section 6M.04, and in other Sections of Part 6 related to accessibility and detectability*
242 *provisions in TTC zones. [add Section reference]*

243 *Pedestrians should be separated from the worksite by appropriate devices that maintain the*
244 *accessibility and detectability for pedestrians with disabilities.*

245 *Bicyclists and pedestrians should not be exposed to unprotected excavations, open utility*
246 *access, overhanging equipment, or other such conditions.*

247 ~~*Except for short duration and mobile operations, when a highway shoulder is occupied, a*~~
248 ~~*SHOULDER WORK (W21-5) sign should be placed in advance of the activity area. When work*~~
249 ~~*is performed on a paved shoulder 8 feet or more in width, channelizing devices should be placed*~~
250 ~~*on a taper having a length that conforms to the requirements of a shoulder taper. Signs should*~~
251 ~~*be placed such that they do not narrow any existing pedestrian passages to less than 48 inches.*~~

252 **[revise per 20B-TTC-03]**

253 *Pedestrian detours should be avoided since pedestrians rarely observe them and the cost of*
254 *providing accessibility and detectability might outweigh the cost of maintaining a continuous*
255 *route. Whenever possible, work should be done in a manner that does not create a need to*
256 *detour pedestrians from existing routes or crossings.*

257 **Standard:**

258 **Where pedestrian routes are closed, alternate pedestrian routes shall be provided.**

259 **When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone,**
260 **the temporary facilities shall be detectable and shall include accessibility features**
261 **consistent with the features present in the existing pedestrian facility.**

262 *Guidance:*

263 *The continuity of a bikeway should be maintained through the TTC zone if practical.*

264 Support:

265 The continuity of a bikeway through the TTC zone is particularly important where bicyclists
266 have been traveling on a shoulder, bike lane, or shared-use path adjacent to a lane (having a
267 speed limit greater than or equal to 35 miles per hour) and there would be a significant safety
268 concern if bicyclists were to share that lane through the TTC zone.

269 On roadways which are not bikeways but where bicyclists (when present) typically share
270 lanes with motor vehicle traffic, the TTC plan and Typical Applications for general traffic will
271 usually be adequate for bicyclists as well.

272 In order to maintain room for bicycle lanes through the TTC zone on a multi-lane roadway,
273 one or more travel lanes could be closed.

274 Guidance:

275 *If a bikeway detour is unavoidable, it should be as short and direct as practical.*

276 *On-road bicyclists should not be directed onto a path or sidewalk intended for pedestrian use*
277 *except where such a path or sidewalk is a shared-use path, or where no practical alternative is*
278 *available (such as might be the case on a bridge in the course of a rehabilitation project).*

279 *If a portion of a bikeway is to be closed due to construction activities and the detoured*
280 *bikeway follows a complex path not in the original bikeway corridor, then a full detour plan*
281 *should be developed and implemented. The TTC for the detour of the bikeway should include all*
282 *necessary advance warning (W21 series) signs, detour (W4-9 series) signs, and any other TTC*
283 *devices necessary to guide bicyclists along the detour route.*

284 Support:

285 Figures 6P-49 through 6P-~~53~~51 provide examples and contain additional information for
286 accommodating bicycles through or around typical work zones. [editorial]

287 Option:

288 If an on-street bikeway had a wide travel lane or lanes in which bicycles traveled side by
289 side with motor vehicles prior to construction, and construction activities reduce the lane
290 width(s) to less than 17 feet through the TTC zone, then the BICYCLES MAY USE FULL
291 LANE (R4-11) sign may be used.

292 **Standard:**

293 **The minimum TTC sign and plaque sizes for shared-use paths shall conform to those**
294 **shown in Table 9B-1. The minimum TTC sign and plaque sizes for on-street bikeways shall**
295 **conform to Chapters 6G, 6H, and 6I.**

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298 **Section 6N.05 Comments:** NCUTCD generally agrees with 6N.05 as presented in the NPA, but
299 recommends adding Option text to allow use of other warning signs in accordance with
300 NCUTCD recommendation 20B-TTC-03.

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302 **Section 6N.05 Work Outside of the Shoulder**

303 Support:

304 When work is being performed off the roadway (beyond the shoulders, but within the right-
305 of-way), little or no TTC might be needed. TTC generally is not needed where work is confined
306 to an area 15 feet or more from the edge of the traveled way. However, TTC is appropriate
307 where distracting situations exist, such as vehicles parked on the shoulder, vehicles accessing the
308 worksite via the highway, and equipment traveling on or crossing the roadway to perform the
309 work operations (for example, mowing). For work beyond the shoulder, see Figure 6P-1.

310 Guidance:

311 *Where the situations described in Paragraph 1 exist, a single warning sign, such as ROAD*
312 *WORK AHEAD (W20-1), should be used. If the equipment travels on the roadway, the*
313 *equipment should be equipped with appropriate flags, high-intensity rotating, flashing,*
314 *oscillating, or strobe lights, and/or a SLOW MOVING VEHICLE (W21-4) sign.*

315 *If work vehicles are on the shoulder, a SHOULDER WORK (W21-5) sign should be used.*
316 *A general warning sign like ROAD MACHINERY AHEAD (W21-3) should be used if workers*
317 *and equipment must occasionally move onto the shoulder.*

318 Option:

319 ~~For mowing operations, When applicable, the sign MOWING AHEAD (W21-8) may be~~
320 ~~used, UTILITY WORK AHEAD (W21-7), SURVEY CREW (W21-6), or other warning signs~~
321 ~~may be used. [revise per 20B-TTC-03]~~

322 Where the activity is spread out over a distance of more than 2 miles, the SHOULDER
323 WORK (W21-5) sign may be repeated every 1 mile.

324 A supplementary plaque with the message NEXT XX MILES (W7-3aP) may be used.
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327 **Section 6N.06 Comments:** NCUTCD generally agrees with 6N.06 as presented in the NPA, but
328 recommends revising as follows in accordance with NCUTCD recommendation 20B-TTC-03:

- 329 • Delete the first Support statement as unnecessary
- 330 • Relocate portions of Guidance from following the first Standard statement to in front of the
331 Standard
- 332 • Revise the first Standard statement to simplify the text and reference an exception for short
333 duration or mobile operations
- 334 • Revise the Guidance statement for clarity
- 335 • Add a reference to expressways in the final Support statement

337 **Section 6N.06 Work on the Shoulder with No Encroachment**

338 **Support:**

339 ~~The provisions of this Section apply to short term through long term stationary operations.~~
340 ~~[delete per 20B-TTC-03]~~

341 *Guidance*

342 *When a paved shoulder is closed, it should be treated as a closure of a portion of the road system*
343 *because road users expect to be able to use it in emergencies. Road users should be given*
344 *advance warning that shoulders are closed for use as refuge areas. The work space on the*
345 *shoulder should be closed off by a taper or channelizing devices with a length of 1/3 L using the*
346 *formulas in Tables 6C-36B-3 and 6C-46B-4. [relocate per 20B-TTC-03]*

347 **Standard:**

348 **When paved shoulders having a width of 8 feet or more are closed, at least one advance**
349 **warning sign shall be used. In addition, Except for short duration or mobile operations,**
350 **channelizing devices shall be used to close the shoulder in advance to delineate the**
351 **beginning of the work space and** direct motor vehicle traffic to remain within the traveled
352 way. [revise per 20B-TTC-03]

353 *Guidance:*

354 *When paved shoulders having a width of 8 feet or more are closed on freeways and*
355 *expressways, road users should be warned about potential disabled vehicles that cannot get off*
356 *the traveled way. An initial general warning sign, such as ROAD WORK AHEAD (W20-1),*
357 *should be used, followed by a RIGHT or LEFT SHOULDER CLOSED (W21-5a) sign. Where*
358 *the downstream end of the shoulder closure extends beyond the distance that can be perceived*
359 *cannot be seen by road users, a supplementary plaque bearing the message NEXT XX FEET*
360 *(W16-4P) or MILES (W7-3aP) should be placed below the SHOULDER CLOSED (W21-5a)*

361 sign. **[revise per 20B-TTC-03]** ~~On multi-lane, divided highways, signs advising of shoulder work~~
362 ~~or the condition of the shoulder should be placed only on the side of the affected shoulder.~~
363 ~~When an improved shoulder is closed on a high-speed roadway, it should be treated as a closure~~
364 ~~of a portion of the road system because road users expect to be able to use it in emergencies.~~
365 ~~Road users should be given ample advance warning that shoulders are closed for use as refuge~~
366 ~~areas throughout a specified length of the approaching TTC zone. The sign(s) should read~~
367 ~~SHOULDER CLOSED (W21-5a) with distances indicated. The work space on the shoulder~~
368 ~~should be closed off by a taper or channelizing devices with a length of 1/3 L using the formulas~~
369 ~~in Tables 6B-3 and 6B-4.~~ **[revise per 20B-TTC-03]**

370 When the shoulder is not occupied but work has adversely affected its condition, the LOW
371 SHOULDER (W8-9) or SOFT SHOULDER (W8-4) sign should be used, as appropriate.

372 Where the condition extends over a distance in excess of 1 mile, the sign should be repeated
373 at 1-mile intervals.

374 Option:

375 In addition, a supplementary plaque bearing the message NEXT XX MILES (W7-3aP) may
376 be used. Temporary traffic barriers may be needed to inhibit encroachment of errant vehicles
377 into the work space and to protect workers.

378 **Standard:**

379 **When used for shoulder work, arrow boards shall operate only in the caution mode.**

380 Support:

381 A typical application for stationary work operations on shoulders is shown in Figure 6P-3.
382 Short duration or mobile work on shoulders is shown in Figure 6P-4. Work on freeway or
383 expressway shoulders is shown in Figure 6P-5. **[revise per 20B-TTC-03]**

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386 **Section 6N.07 Comments:** NCUTCD agrees with 6N.07 as presented in the NPA.

388 **Section 6N.07 Work on the Shoulder with Minor Encroachment**

389 Support:

390 Chapter 6C and Sections 6M.04 and 6N.04 contain additional information regarding the steps
391 to follow when pedestrian or bicycle facilities are affected by the worksite.

392 *Guidance:*

393 *When work takes up part of a lane, vehicular traffic volumes, vehicle mix (buses, trucks, cars,*
394 *and bicycles), speed, and capacity should be analyzed to determine whether the affected lane*
395 *should be closed. Unless the lane encroachment permits a remaining lane width of 10 feet, the*
396 *lane should be closed.*

397 *Truck off-tracking should be considered when determining whether the minimum lane width*
398 *of 10 feet is adequate.*

399 Option:

400 A lane width of 9 feet may be used for short-term stationary work on low-volume, low-speed
401 roadways when vehicular traffic does not include longer and wider heavy commercial vehicles.

402 Support:

403 Figure 6P-6 illustrates a method for handling vehicular traffic where the stationary or short
404 duration work space encroaches slightly into the traveled way.

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407 **Section 6N.08 Comments:** NCUTCD agrees with 6N.08 as presented in the NPA.
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409 **Section 6N.08 Work Within the Median**

410 Support:

411 Chapter 6C and Sections 6M.04 and 6N.04 contain additional information regarding the steps
412 to follow when pedestrian or bicycle facilities are affected by the worksite.

413 *Guidance:*

414 *If work in the median of a divided highway is within 15 feet from the edge of the traveled way*
415 *for either direction of travel, TTC should be used through the use of advance warning signs and*
416 *channelizing devices.*

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419 **Section 6N.09 Comments:** NCUTCD agrees with 6N.09 as presented in the NPA.
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421 **Section 6N.09 Work Within the Traveled Way of a Two-Lane Highway**

422 Support:

423 Chapter 6C and Sections 6M.04 and 6N.04 contain additional information regarding the steps
424 to follow when pedestrian or bicycle facilities are affected by the worksite.

425 Detour signs are used to direct road users onto another roadway. At diversions, road users
426 are directed onto a temporary roadway or alignment placed within or adjacent to the right-of-
427 way. Typical applications for detouring or diverting road users on two-lane highways are shown
428 in Figures 6P-7, 6P-8, and 6P-9. Figure 6P-7 illustrates the controls around an area where a
429 section of roadway has been closed and a diversion has been constructed. Channelizing devices
430 and pavement markings are used to indicate the transition to the temporary roadway.

431 *Guidance:*

432 *When a detour is long, Detour (M4-8, M4-9) signs should be installed to remind and*
433 *reassure road users periodically that they are still successfully following the detour.*

434 *When an entire roadway is closed, as illustrated in Figure 6P-8, a detour should be provided*
435 *and road users should be warned in advance of the closure, which in this example is a closure 10*
436 *miles from the intersection. If local road users are allowed to use the roadway up to the closure,*
437 *the ROAD CLOSED AHEAD, LOCAL TRAFFIC ONLY (R11-3a) sign should be used. The*
438 *portion of the road open to local road users should have adequate signing, marking, and*
439 *delineation.*

440 *Detours should be signed so that road users will be able to traverse the entire detour route*
441 *and back to the original roadway as shown in Figure 6P-9.*

442 Support:

443 Techniques for controlling vehicular traffic under one-lane, two-way conditions are
444 described in Section 6E.01.

445 Option:

446 Flaggers may be used as shown in Figure 6P-10.

447 STOP/YIELD sign control may be used on roads with low traffic volumes as shown in
448 Figure 6P-11.

449 A temporary traffic control signal may be used as shown in Figure 6P-12.

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452 **Section 6N.10 Comments:** NCUTCD agrees with 6N.10 as presented in the NPA.

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Section 6N.10 Work Within the Traveled Way of an Urban Street

Support:

Chapter 6C and Sections 6M.04 and 6N.04 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

In urban TTC zones, decisions are needed on how to control vehicular traffic, such as how many lanes are required, whether any turns need to be prohibited at intersections, and how to maintain access to business, industrial, and residential areas.

Pedestrian traffic needs separate attention. Chapter 6C contains information regarding pedestrian movements near TTC zones.

Standard:

If the TTC zone affects the movement of bicyclists, adequate access to the roadway or shared-use paths shall be provided (see Part 9).

Where transit stops are affected or relocated because of work activity, both pedestrian and vehicular access to the affected or relocated transit stops shall be provided.

Guidance:

If a designated bicycle route is closed because of the work being done, a signed alternate route should be provided. Bicyclists should not be directed onto the path used by pedestrians.

Worksites within the intersection should be protected against inadvertent pedestrian incursion by providing detectable channelizing devices.

Support:

Utility work takes place both within and outside the roadway to construct and maintain services such as power, gas, light, water, or telecommunications. Operations often involve intersections, since that is where many of the network junctions occur. The work force is usually small, only a few vehicles are involved, and the number and types of TTC devices placed in the TTC zone is usually minimal.

Guidance:

As discussed under short-duration projects, however, the reduced number of devices in utility work zones should be offset by the use of high-visibility devices, such as high-intensity rotating, flashing, oscillating, or strobe lights on work vehicles or high-level warning devices.

Support:

Figures 6P-6, 6P-10, 6P-15, 6P-18, 6P-21, 6P-22, 6P-23, 6P-26, and 6P-33 are examples of typical applications for utility operations. Other typical applications might apply as well.

Section 6N.11 Comments: NCUTCD agrees with 6N.11 as presented in the NPA.

Section 6N.11 Work Within the Traveled Way of a Multi-Lane, Non-Access Controlled Highway

Support:

Chapter 6C and Sections 6M.04 and 6N.04 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

Work on multi-lane (two or more lanes of moving motor vehicle traffic in one direction) highways is divided into right-lane closures, left-lane closures, interior-lane closures, multiple-lane closures, and closures on five-lane roadways.

Standard:

499 **When a lane is closed on a multi-lane road for other than a mobile operation, a**
500 **transition area containing a merging taper shall be used.**

501 *Guidance:*

502 *When justified by an engineering study, temporary traffic barriers (see Section 6K.09) should*
503 *be used to prevent incursions of errant vehicles into hazardous areas or work space.*

504 *Support:*

505 *Figure 6P-34 illustrates a lane closure in which temporary traffic barriers are used.*

506 *Option:*

507 *When the right-hand lane is closed, TTC similar to that shown in Figure 6P-33 may be used*
508 *for undivided or divided four-lane roads.*

509 *Guidance:*

510 *If morning and evening peak hour vehicular traffic volumes in the two directions are uneven*
511 *and the greater volume is on the side where the work is being done in the right-hand lane,*
512 *consideration should be given to closing the inside lane for opposing vehicular traffic and*
513 *making the lane available to the side with heavier vehicular traffic, as shown in Figure 6P-31.*

514 *If the larger vehicular traffic volume changes to the opposite direction at a different time of*
515 *the day, the TTC should be changed to allow two lanes for opposing vehicular traffic by moving*
516 *the devices from the opposing lane to the center line. When it is necessary to create a temporary*
517 *center line that is not consistent with the pavement markings, channelizing devices should be*
518 *used and closely spaced.*

519 *Option:*

520 *When closing a left-hand lane on a multi-lane undivided road, as vehicular traffic flow*
521 *permits, the two interior lanes may be closed, as shown in Figure 6P-30, to provide drivers and*
522 *workers additional lateral clearance and to provide access to the work space.*

523 **Standard:**

524 **When only the left-hand lane is closed on undivided roads, channelizing devices shall be**
525 **placed along the center line as well as along the adjacent lane.**

526 *Guidance:*

527 *When an interior lane is closed, an adjacent lane should also be considered for closure to*
528 *provide additional space for vehicles and materials and to facilitate the movement of equipment*
529 *within the work space.*

530 *When multiple lanes in one direction are closed, a capacity analysis should be made to*
531 *determine the number of lanes needed to accommodate motor vehicle traffic needs. Vehicular*
532 *traffic should be moved over one lane at a time. As shown in Figure 6P-37, the tapers should be*
533 *separated by a distance of 2L, with L being determined by the formulas in Tables 6B-3 and 6B-4.*

534 *Option:*

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

537 **Standard:**

538 **When a directional roadway is closed, inapplicable WRONG WAY signs and markings,**
539 **and other existing traffic control devices at intersections within the temporary two-lane,**
540 **two-way operations section shall be covered, removed, or obliterated.**

541 *Option:*

542 *When half the road is closed on an undivided highway, both directions of vehicular traffic*
543 *may be accommodated as shown in Figure 6P-32. When both interior lanes are closed,*

544 temporary traffic controls may be used as provided in Figure 6P-30. When a roadway must be
545 closed on a divided highway, a median crossover may be used (see Section 6N.15).

546 Support:

547 TTC for lane closures on five-lane roads is similar to other multi-lane undivided roads.

548 Figure 6P-32 can be adapted for use on five-lane roads. Figure 6P-35 can be used on a five-lane
549 road for short duration and mobile operations.

550

551

552 **Section 6N.12 Comments:** NCUTCD generally agrees with 6N.12 as presented in the NPA, but
553 recommends revising section references in the final paragraph.

554

555 **Section 6N.12 Work Within the Traveled Way at an Intersection**

556 Support:

557 Chapter 6C and Sections 6M.04 and 6N.04 contain additional information regarding the steps
558 to follow when pedestrian or bicycle facilities are affected by the worksite.

559 The typical applications for intersections are classified according to the location of the work
560 space with respect to the intersection area (as defined by the extension of the curb or edge lines).

561 The three classifications are near side, far side, and in-the-intersection. Work spaces often
562 extend into more than one portion of the intersection. For example, work in one quadrant often
563 creates a near-side work space on one street and a far-side work space on the cross street. In
564 such instances, an appropriate TTC plan is obtained by combining features shown in two or more
565 of the intersection and pedestrian typical applications.

566 TTC zones in the vicinity of intersections might block movements and interfere with normal
567 road user flows. Such conflicts frequently occur at more complex signalized intersections having
568 such features as traffic signal heads over particular lanes, lanes allocated to specific movements,
569 multiple signal phases, signal detectors for actuated control, and accessible pedestrian signals
570 and detectors.

571 *Guidance:*

572 *The effect of the work upon signal operation should be considered, and temporary corrective*
573 *actions should be taken, if necessary, such as revising signal phasing and/or timing to provide*
574 *adequate capacity, maintaining or adjusting signal detectors, and relocating signal heads to*
575 *provide adequate visibility as described in Part 4.*

576 **Standard:**

577 **When work will occur near an intersection where operational, capacity, or pedestrian**
578 **accessibility problems are anticipated, the highway agency having jurisdiction shall be**
579 **contacted.**

580 *Guidance:*

581 *For work at an intersection, advance warning signs, devices, and markings should be used*
582 *on all cross streets, as appropriate. The typical applications depict urban intersections on*
583 *arterial streets. Where the posted speed limit, the off-peak 85th-percentile speed prior to the*
584 *work starting, or the anticipated speed exceeds 40 mph, additional warning signs should be used*
585 *in the advance warning area.*

586 *Pedestrian crossings near TTC sites should be separated from the worksite by appropriate*
587 *barriers that maintain the accessibility and detectability for pedestrians with disabilities.*

588 Support:

589 Near-side work spaces, as depicted in Figure 6P-21, are simply handled as a midblock lane
590 closure. A problem that might occur with near-side lane closure is a reduction in capacity, which
591 during certain hours of operation could result in congestion and backups.

592 Option:

593 When near-side work spaces are used, an exclusive turn lane may be used for through
594 vehicular traffic.

595 Where space is restricted in advance of near-side work spaces, as with short block spacings,
596 two warning signs may be used in the advance warning area, and a third action-type warning or a
597 regulatory sign (such as Keep Left) may be placed within the transition area.

598 Support:

599 Far-side work spaces, as depicted in Figures 6P-22 through 6P-25, involve additional
600 treatment because road users typically enter the activity area by straight-through and left- or
601 right-turning movements.

602 *Guidance:*

603 *When a lane through an intersection must be closed on the far side, it should also be closed*
604 *on the near-side approach to preclude merging movements within the intersection.*

605 Option:

606 If there are a significant number of vehicles turning from a near-side lane that is closed on
607 the far side, the near-side lane may be converted to an exclusive turn lane.

608 Support:

609 Figures 6P-26 and 6P-27 provide guidance on applicable procedures for work performed
610 within the intersection.

611 Option:

612 If the work is within the intersection, any of the following strategies may be used:

- 613 A. A small work space so that road users can move around it, as shown in Figure 6P-26;
- 614 B. Flaggers or uniformed law enforcement officers to direct road users, as shown in Figure
615 6P-27;
- 616 C. Work in stages so the work space is kept to a minimum; and
- 617 D. Road closures or upstream diversions to reduce road user volumes.

618 *Guidance:*

619 *Depending on road user conditions, a flagger(s) and/or a uniformed law enforcement*
620 *officer(s) should be used to control road users.*

621 Support:

622 Work at a roundabout can present a challenge for developing an effective TTC
623 plan. Figures 6P-4752 and 6P-4854 provide guidance on applicable procedures for work
624 performed within a roundabout. [revise Section references]

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- 626
- 627 **Section 6N.13 Comments:** NCUTCD recommends revising 6N.13 as follows:
- 628 • Revise part of the first Support statement to Guidance and add text referencing extended
629 queues, the closure of ramps, and the use of diversions
 - 630 • Revise part of the first Support statement to Option
 - 631 • Revise text throughout the Section for clarity and to revise section and figure references

633 **Section 6N.13 Work Within the Traveled Way of a Freeway or Expressway**

634 Support:

635 ~~Problems of TTC might occur under the special~~ Special conditions encountered where
636 vehicular traffic must be moved through or around TTC zones on high-speed, high-volume
637 roadways can pose challenges to the TTC. Although the general principles outlined in ~~the~~
638 ~~previous Sections of~~ this Manual are applicable to all types of highways, high-speed, access-
639 controlled highways need special planning and attention in order to accommodate vehicular
640 traffic while also protecting road users and workers. The ~~road user~~ volumes, ~~road~~ vehicle mix
641 (buses, trucks, cars, and bicycles, if permitted), and speed of vehicles on these facilities require
642 that careful TTC procedures be implemented, for example, to induce critical merging maneuvers
643 well in advance of work spaces and in a manner that creates minimum turbulence and delay in
644 the vehicular traffic stream. [TTC edited for clarity]

645 When ~~Often, when~~ the roadway capacity is reduced due ~~the to~~ lane closures, the demand can
646 will exceed the available capacity and result in either a lengthy stopped or slow moving queue of
647 vehicles that might ~~may~~ extend past the normal signs ~~used shown~~ in the typical advance warning
648 area. [change a portion of the new Support statement to Guidance directly below and edit for
649 clarity]

650 Guidance:

651 *An assessment of the expected queue length should be a part of the temporary traffic control*
652 *plan design process. ~~Adjustments and adjustments~~ to the sign spacing and number of signs as*
653 *well as the possibility of using more conspicuous devices should be considered ~~may be provided~~*
654 *to increase the distance and conspicuity of the advance warning area when extended queues are*
655 *expected.* [change to Guidance the above portion of the new Support Statement and edit for
656 clarity]

657 *For high-volume roadways and freeways, the closure of selected entrance ramps or other*
658 *access points and the use of signed diversion routes should be evaluated.* [add Guidance
659 statement]

660 Option:

661 Work during off-peak hours or at night (see Section 6N.18) may be employed to mitigate
662 extended queues that are expected during periods of peak demand. ~~One strategy often employed~~
663 ~~to mitigate the extended queue issue is to work during off peak hours or at night.~~ When the work
664 is limited to night hours, increased ~~us~~ use of warning lights, illumination of work spaces, positive
665 protection devices, and intelligent advance warning systems may be necessary used. [change the
666 Support to an Option with edits for clarity]

667 Support:

668 TTC for a typical lane closure where a queue is not anticipated to accumulate on a divided
669 highway is shown in ~~Figure~~ Figures 6P-33 and 6P-34. Temporary traffic controls for short
670 duration and mobile operations on freeways are shown in Figure 6P-35. A typical application for
671 shifting vehicular traffic lanes around a work space is shown in Figure 6P-36. TTC for multiple
672 and interior lane closures on a freeway is shown in Figures 6P-37 and 6P-38. [edit for clarity]

673 Guidance:

674 *The method for closing an interior lane when the open lanes have the capacity to carry*
675 *vehicular traffic should be as shown in Figure 6P-37. When the capacity of the other lanes is*
676 *needed, the method shown in Figure 6P-38 should be used.*

677
678

679 **Section 6N.14 Comments:** NCUTCD generally agrees with 6N.14 as presented in the NPA, but
680 recommends revising a reference to opposing traffic lane dividers in accordance with Chapter
681 6H.

682
683 **Section 6N.14 Two-Lane, Two-Way Traffic on One Roadway of a Normally Divided**
684 **Highway**

685 Support:

686 Two-lane, two-way operation on one roadway of a normally divided highway is a typical
687 procedure that requires special consideration in the planning, design, and work phases, because
688 unique operational problems (for example, increasing the risk of head-on crashes) can arise with
689 the two-lane, two-way operation.

690 **Standard:**

691 **When two-lane, two-way traffic control must be maintained on one roadway of a normally**
692 **divided highway, opposing vehicular traffic shall be separated with either temporary**
693 **traffic barriers (concrete safety-shape or approved alternate), channelizing devices,**
694 **~~opposing traffic lane dividers, Opposing Lane Traffic Divider (W6-4) signs on flexible~~**
695 **~~supports (see Section 6H.17), or a temporary raised island throughout the length of the~~**
696 **two-way operation. The use of markings and complementary signing, by themselves, shall**
697 **not be used.** [edit to match 6H.17]

698 Support:

699 Figure 6P-39 shows the procedure for two-lane, two-way operation. Treatments for entrance
700 and exit ramps within the two-way roadway segment of this type of work are shown in Figures
701 6P-40 and 6P-41.

703
704 **Section 6N.15 Comments:** NCUTCD agrees with 6N.15 as presented in the NPA.

705
706 **Section 6N.15 Crossovers**

707 *Guidance:*

708 *The following are considered good guiding principles for the design of crossovers:*

- 709 *A. Tapers for lane drops should be separated from the crossovers, as shown in Figure 6P-*
710 *39.*
711 *B. Crossovers should be designed for speeds no lower than 10 mph below the posted speed,*
712 *the off-peak 85th-percentile speed prior to the work starting, or the anticipated operating*
713 *speed of the roadway, unless unusual site conditions require that a lower design speed be*
714 *used.*
715 *C. A good array of channelizing devices, delineators, and full-length, properly placed*
716 *pavement markings should be used to provide drivers with a clearly defined travel path.*
717 *D. The design of the crossover should accommodate all vehicular traffic, including trucks*
718 *and buses.*

719 Support:

720 Temporary traffic barriers and the excessive use of TTC devices cannot compensate for poor
721 geometric and roadway cross-section design of crossovers.

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723
724 **Section 6N.16 Comments:** NCUTCD agrees with 6N.16 as presented in the NPA.

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Section 6N.16 Interchanges

Guidance:

Access to interchange ramps on limited-access highways should be maintained even if the work space is in the lane adjacent to the ramps. Access to exit ramps should be clearly marked and delineated with channelizing devices. For long-term projects, conflicting pavement markings should be removed and new ones placed. Early coordination with officials having jurisdiction over the affected cross streets and providing emergency services should occur before ramp closings.

Option:

If access is not possible, ramps may be closed by using signs and Type 3 Barricades. As the work space changes, the access area may be changed, as shown in Figure 6P-42. A TTC zone in the exit ramp may be handled as shown in Figure 6P-43.

When a work space interferes with an entrance ramp, a lane may need to be closed on the freeway (see Figure 6P-44). A TTC zone in the entrance ramp may require shifting ramp vehicular traffic (see Figure 6P-44).

Section 6N.17 Comments: NCUTCD agrees with 6N.17 as presented in the NPA.

Section 6N.17 Work in the Vicinity of a Grade Crossing

Standard:

When grade crossings exist either within or in the vicinity of a TTC zone, lane restrictions, flagging, or other operations shall not create conditions where vehicles can be queued across the tracks. If the queuing of vehicles across the tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the crossing to prevent vehicles from stopping on the tracks, even if automatic warning devices are in place.

Support:

Figure 6P-46 shows work in the vicinity of a grade crossing.

Section 8A.14 contains additional information regarding temporary traffic control zones in the vicinity of grade crossings.

Guidance:

Early coordination with the railroad company or light rail transit agency should occur before work starts.

Section 6N.18 Comments: NCUTCD agrees with 6N.18 as presented in the NPA.

Section 6N.18 Work During Nighttime Hours

Support:

Section 6A.05 contains additional information regarding considerations for conducting work operations during nighttime hours.

Guidance:

Considering the safety issues inherent to night work, consideration should be given to enhancing traffic controls (see Section 6N.03) to provide added visibility and driver guidance, and increased protection for workers.

771 *In addition to the enhancements listed in Section 6N.03, consideration should be given to*
772 *providing additional lights and retroreflective markings to workers, work vehicles, and*
773 *equipment.*

774 **Option:**

775 Where reduced traffic volumes at night make it feasible, the entire roadway may be closed by
776 detouring traffic to alternate facilities, thus removing the traffic risk from the activity area.

777 **Guidance:**

778 *Consideration should be given to stationing uniformed law enforcement officers and lighted*
779 *patrol cars at night work locations where there is a concern that high speeds or impaired drivers*
780 *might result in undue risks for workers or other drivers.*

781 **Standard:**

782 **Except in emergencies, temporary lighting shall be provided at all flagger stations used**
783 **during nighttime work.**

784 **Support:**

785 Desired illumination levels vary depending upon the nature of the task involved. An average
786 horizontal luminance of 5 foot candles can be adequate for general activities. An average
787 horizontal luminance of 10 foot candles can be adequate for activities around equipment. Tasks
788 requiring high levels of precision and extreme care can require an average horizontal luminance
789 of 20 foot candles.

790

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792 **Section 6N.19 Comments:** NCUTCD generally agrees with 6N.19 as presented in the NPA, but
793 recommends revising to delete the term ‘high speed’ from Guidance, since this merge is
794 routinely used on high speed facilities, plus other revisions for clarity.

795

796 **Section 6N.19 Late Merge**

797 **Support:**

798 In a ~~The~~ Late Merge ~~is~~ operation it is intended that traffic ~~designed to~~ use all available lanes
799 until the merge point is reached at the lane closure taper rather than merging as soon as possible
800 into the open lane. ~~A The~~ Late Merge operation addresses many of the problems associated with
801 traffic operations ~~upstream in advance~~ of a lane ~~closure~~ ~~closure~~ ~~at in a work zones zone to~~
802 ~~include including~~ queue length, capacity and driver satisfaction. [edit for clarity]

803 **Option:**

804 A Late Merge operation may be communicated via either ~~Late merging systems may consist~~
805 ~~of~~ static or portable changeable message signs. [edit for clarity]

806 **Guidance:**

807 Static Late Merge signing should consist of the STAY IN LANE TO MERGE POINT (R4-9a)
808 sign and the MERGE HERE TAKE TURNS (W9-2a) sign (see Figure 6N-1).

809 ~~If used, the A~~ Late Merge operation should not be used on ~~high speed or~~ low volume
810 roadways. [delete of ‘high speed’ and edit for clarity]

811 **Option:**

812 The following messages may be used on changeable message signs during the late merge
813 ~~application~~ operation: [edit for clarity]

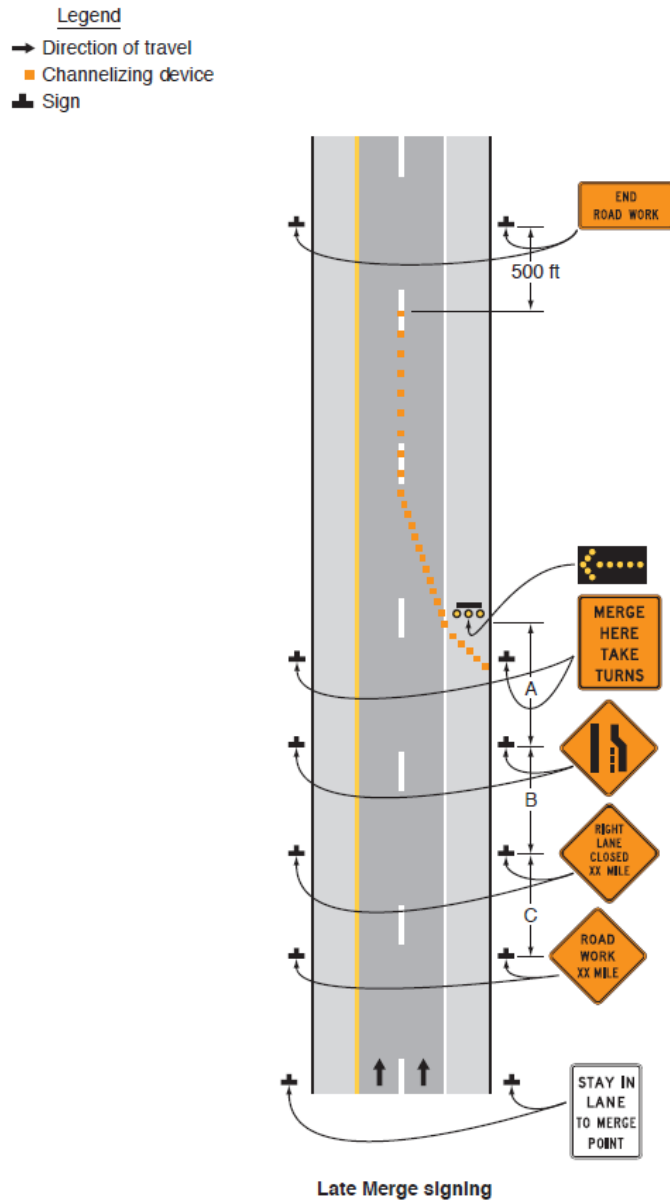
814 A. “STAY IN YOUR LANE / MERGE AHEAD”

815 B. “USE BOTH LANES / TO MERGE POINT “; “TAKE YOUR TURN / MERGE HERE”

- 816 C. “SLOW TRAFFIC AHEAD / USE BOTH LANES”, “STAY IN YOUR LANE /
- 817 MERGE AHEAD XX MILES”, “TAKE YOUR TURN / MERGE HERE”
- 818 D. “USE BOTH LANES,” “STOPPED STOP-TRAFFIC AHEAD,” “MERGE HERE,” and
- 819 “TAKE TURNS” [edit for clarity]
- 820 E. “STAY IN YOUR LANE” / “MERGE AHEAD”

Figure 6N-1 Comments: NCUTCD agrees with Figure 6N-1 as presented in the NPA.

Figure 6N-1. Late Merge



823