



National Committee on Uniform Traffic Control Devices

13236 North 7th Street, Suite 4-259, Phoenix, Arizona 85022
Phone/Text: 231-4-NCUTCD (231-462-8823)
E-mail: secretary@ncutcd.org

Item No.: 20A-RW-01

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

TECHNICAL COMMITTEE: Regulatory & Warning Signs Technical Committee & Temporary Traffic Control Technical Committee
ITEM NUMBER: 20A-RW-01
TOPIC: STOP/SLOW Paddle LED Lights
ORIGIN OF REQUEST: Robert Weber. Task Force Members: Jim Pline (Chair), Dan Paddick and Gerry Willhelm (RWSTC) and Bill Anderson and Ryan Lancaster (TTC)
AFFECTED SECTIONS OF MUTCD: 6E.03, 6E.05 and 7D.05

DEVELOPMENT HISTORY:

- Approved by RW Technical Committee: 01/08/2020
- Approved by TTC Technical Committee: 01/08/2020
- Approved by RW Technical Committee following sponsor comments: 06/17/2020
- Approved by TTC Technical Committee following sponsor comments: 06/17/2020
- Approved by NCUTCD Council: 01/20/2021

This is a proposal for recommended changes to the MUTCD that has been approved by the NCUTCD Council. This proposal does not represent a revision of the MUTCD and does not constitute official MUTCD standards, guidance, or options. It will be submitted to FHWA for consideration for inclusion in a future MUTCD revision. The MUTCD can be revised only by the FHWA through the federal rulemaking process.

SUMMARY:

The 2009 MUTCD includes five optional lights and lighting patterns for STOP/SLOW paddles in temporary traffic control zones (Section 6E.03) and for use by School Crossing Guards (Section 7D.05). The NCUTCD Council approved some general provisions for LED Sign Applications (14A-RW-07) on June 28, 2014. Several of those provisions are not consistent with the STOP/SLOW paddle lighting provisions. Thus there is a need to revisit the optional lights and lighting patterns.

DISCUSSION:

The application of a beacon within the sign legend was initially approved by the FHWA on 9/16/74 under Revision Sn-99 to the 1972 MUTCD. It was based on a request from the Ohio DOT to accommodate the Wink-o-Matic School Speed Limit sign widely used by schools throughout the Midwest and Eastern States. That option was included in the 1978, 1988, 2000

33 and 2003 editions of the MUTCD. It was deleted from Part 7 Schools in the 2009 MUTCD and
34 recommended for deletion from Part 4 Traffic Signals by Council action on 1/11/13.

35
36 However, the use of flashers within sign legends was carried over to the STOP/SLOW paddles
37 when the FHWA published a newsletter (Publication FHWA-SA-97-025) in July 1997 citing the
38 improved conspicuity of STOP/SLOW Paddles with flashing lights. They followed that by
39 including the following provisions in Section 6E.03 of the 2000 MUTCD:

40 *“Option: The STOP/SLOW paddle may be modified to improve conspicuity by incorporating*
41 *white flashing lights. Two lights may be installed and centered vertically above and below*
42 *the STOP legend, or centered horizontally on either side of the STOP legend. Instead of the*
43 *above two-light arrangement, one light may be centered below the STOP legend.”*

44
45 The 2003 MUTCD expanded those additional lights by providing the following Option
46 provisions in Section 6E.03:

47 *“Option: The STOP/SLOW paddle may be modified to improve conspicuity by incorporating*
48 *either white or red flashing lights on the STOP face and either white or yellow flashing*
49 *lights on the SLOW face. The flashing lights may be arranged in any of the following*
50 *patterns:*

- 51 *A. Two white or red lights, one centered vertically above and one centered vertically*
52 *below the STOP legend: and/or two white or yellow lights, one centered vertically*
53 *above and one centered vertically below the SLOW legend; or*
54 *B. Two white or red lights, one centered horizontally on each side of the STOP legend:*
55 *and /or two white or yellow lights, one centered horizontally on each side of the SLOW*
56 *legend; or*
57 *C. One white or red light centered below the STOP legend: and/or one white or yellow*
58 *light centered below the SLOW legend; or*
59 *D. A series of eight or more small white or red lights no larger than 6 mm (0.25 in) in*
60 *diameter along the outer edge of the paddle, arranged in an octagonal pattern at the*
61 *eight corners of the border of the STOP face: and/or a series of eight or more small*
62 *white or yellow lights no larger than 6 mm (0.25 in) in diameter along the outer edge of*
63 *the paddle, arranged in a diamond pattern along the border of the SLOW face.*
64 *E. A series of white lights forming the shapes of the letters in the legend.”*

65
66 The STOP paddle provisions for white or red flashing lights were also included as an option in
67 Section 7E.05 for School Crossing Guards. The basis for adding the above five Options was
68 proposed by FHWA and included in the 2003 MUTCD rulemaking to improve conspicuity. The
69 only research found relative to effectiveness of the options was the TTI report cited below and
70 Mr. Paddick’s research in New York.

71
72 The 2009 MUTCD has included these optional lights and lighting patterns for STOP/SLOW
73 paddles in temporary traffic control (Section 6E.03) and School Crossing Guards (Section
74 7D.05) and carried to a Standard in the Automated Flagger Assistance Devices (AFAD),
75

76 The NCUTCD Council approved some general provisions for LED Sign Applications (14A-RW-
77 07) on June 28, 2014. Several of those provisions are not consistent with the STOP/SLOW
78 paddle provisions as follows:

- 79 1. Maximum pitch of LED light applications for sign legend of 20 mm.
- 80 2. LED flashing rate of 50 -120 times per minute with no sequential flashing or variable
- 81 (dancing) flash.
- 82 3. A cluster of LEDs shall not be used within the border of a sign.
- 83 4. The LEDs shall have dimming capabilities and shall not produce a disability glare
- 84 obscuring the sign legend.
- 85 5. LEDs in the border of a sign are recommended to be the same color as the background of
- 86 the sign.

87
88 The FHWA added the red LEDs for STOP paddles and the yellow LEDs for SLOW paddles to
89 the final rulemaking for the 2003 MUTCD based on the New York study of “The Effectiveness
90 of STOP/SLOW Paddles Equipped with Flashing Red and Flashing Yellow Lights” by Daniel
91 Paddick.

92
93 The Texas Transportation Institute researched the effectiveness of automated flagger assistance
94 devices and school crossing devices with a published report on January 2012. The full report can
95 be found at “FHWA/TX-12/0-6407-1”. Their conclusions relative to School STOP paddles were
96 as follows:

97 “The safety of crossing guards is important because it is their responsibility to make sure
98 that schoolchildren cross the street safely and efficiently. Through discussions, it was found
99 that crossing guards were very interested in using stop paddles with embedded lights to
100 improve the conspicuity of the paddles. There was a concern, however, that some of the
101 embedded light configurations might negatively affect a motorist's ability to recognize the
102 three critical characteristics that define a stop sign: red background color, octagon shape,
103 and white stop legend. A closed-course human factors study was conducted to assess the
104 effectiveness of five stop paddles with embedded lights as compared with that of a standard,
105 unlit stop paddle. On the basis of the findings from this study, the use of three stop paddle
106 configurations is recommended to improve the conspicuity of crossing guards without
107 negatively affecting a motorist's ability to recognize the three critical characteristics of a stop
108 sign. These configurations are

- 109 a) a stop paddle containing flashing red lights arranged in an octagonal pattern at the eight
- 110 corners of the paddle,
- 111 b) a stop paddle containing a series of steady-burn red lights around the border arranged
- 112 such that the lights clearly convey the octagonal shape of the paddle, and
- 113 c) a stop paddle containing a series of flashing red lights around the border arranged such
- 114 that the lights clearly convey the octagonal shape of the paddle.

115
116 Because the *Manual on Uniform Traffic Control Devices* does not currently address the
117 issue of steady-burn lights, agencies should contact FHWA before they use a stop paddle
118 with a steady-burn light configuration.”

119
120 As identified by the TTI research, the application of LEDs within a sign background can obscure
121 the critical characteristics of a sign, i.e. color, shape and legend. A cluster of LEDs presents a
122 light source that closely resembles a flashing beacon. That was the basis for prohibiting a cluster
123 of LEDs within the background of a sign when the Council approved MUTCD LED Sign

124 Applications on 6/28/14. The STOP/SLOW paddles were excluded from these recommended
125 LED sign provisions.

126
127 The shape, color and legend of the STOP/SLOW paddles are important to their use in the field to
128 control traffic. The LEDs on the paddle do provide improved conspicuity and advance notice of a
129 traffic control situation well in advance of the motorist being able to identify their appropriate
130 response. However, it is questionable if this improved conspicuity should nullify the basic
131 characteristics of the paddle. Is the conspicuity needed for temporary traffic control since the
132 Flagger is required to wear high visibility clothing (Section 6E.02), have advance signing
133 (Section 6F.31) and be illuminated if under nighttime operations (Section 6E.08)?

134
135 A search of the manufacturers of STOP/SLOW Paddles on the internet identified 29 companies
136 that supply paddles with various configurations as follows:

- 137 1. Five suppliers provide the white/red and white/yellow LEDs clusters above and below the
138 paddle legends. One manufacturer provides the product to four of the suppliers of the
139 paddle.
- 140 2. One supplier provides white/red and white/yellow LEDs clusters each side of the paddle
141 legend and that supplier is also the manufacturer for the four suppliers in Item 1 above.
- 142 3. No manufacturer provides a paddle with the LEDs below the paddle legend.
- 143 4. Thirteen provide paddles with white/red/yellow LEDs around the border.
- 144 5. Thirteen provide paddles with white LEDs forming the legend for STOP/SLOW paddles.

145
146 The multiple options for use of LEDs in STOP/SLOW paddles are potentially unnecessary and
147 could be reduced for the following reasons:

- 148 1. They are not consistent with previous Council action to eliminate flashing beacons and
149 clusters of LEDs within the background of signs.
- 150 2. The TTI research indicates that LEDs in the sign legend affects the motorist's ability to
151 recognize the basic characteristics of the sign.
- 152 3. The increased conspicuity of LEDs may not be that important for driver response.
- 153 4. The preferred color of LEDs are red for STOP and orange for SLOW, background color,
154 permitting the elimination of the white LEDs except for the paddle legends.
- 155 5. The number of manufacturers of some options are either non-existent or limited.
- 156 6. Observation of LED clusters within the sign background obscures the capability to
157 recognize the sign legend.

158 159 **RECOMMENDED MUTCD CHANGES**

160
161 The following present the proposed changes to the current MUTCD within the context of the
162 current MUTCD language. Proposed additions to the MUTCD are shown in blue underline and
163 proposed deletions from the MUTCD are shown in ~~red strikethrough~~. Changes previously
164 approved by NCUTCD Council (but not yet adopted by FHWA) are shown in green double
165 underline for additions and ~~green double strikethrough~~ for deletions. In some cases, background
166 comments may be provided with the MUTCD text. These comments are indicated by [black font
167 in brackets highlighted light blue].

168
169

170 PART 6. TEMPORARY TRAFFIC CONTROL

171
172 CHAPTER 6E. FLAGGER CONTROL

173
174 Section 6E.03 Hand-Signaling Devices

175 *Guidance:*

176 01 *The STOP/SLOW paddle should be the primary and preferred hand-signaling device*
177 *because the STOP/SLOW paddle gives road users more positive guidance than red flags. Use of*
178 *flags should be limited to emergency situations.*

179 **Standard:**

180 02 **The STOP/SLOW paddle shall have an octagonal shape on a rigid handle.**
181 **STOP/SLOW paddles shall be at least 18 inches wide with letters at least 6 inches high. The**
182 **STOP (R1-1) face shall have white letters and a white border on a red background. The**
183 **SLOW (W20-8) face shall have black letters and a black border on an orange background.**
184 **When used at night, the STOP/SLOW paddle shall be retroreflectorized.**

185 *Guidance:*

186 03 *The STOP/SLOW paddle should be fabricated from light semi-rigid material.*

187 **Support:**

188 04 **The optimum method of displaying a STOP or SLOW message is to place the STOP/SLOW**
189 **paddle on a rigid staff that is tall enough that when the end of the staff is resting on the ground,**
190 **the message is high enough to be seen by approaching or stopped traffic.**

191 **Option:**

192 05 **The STOP/SLOW paddle may be modified to improve conspicuity by incorporating either**
193 **white or red flashing lights on the STOP face, and either white or yellow flashing lights on the**
194 **SLOW face. The flashing lights may be arranged in any either of the following patterns:**

195 ~~A. Two white or red lights, one centered vertically above and one centered vertically below~~
196 ~~the STOP legend; and/or two white or yellow lights, one centered vertically above and~~
197 ~~one centered vertically below the SLOW legend;~~

198 ~~B. Two white or red lights, one centered horizontally on each side of the STOP legend;~~
199 ~~and/or two white or yellow lights, one centered horizontally on each side of the SLOW~~
200 ~~legend;~~

201 ~~C. One white or red light centered below the STOP legend; and/or one white or yellow~~
202 ~~light centered below the SLOW legend;~~

203 ~~D. A. A series of eight or more small ~~white or~~ red lights no larger than 1/4 inch in diameter~~
204 ~~along the outer edge of the paddle, arranged in an octagonal pattern at the eight corners~~
205 ~~of the border of the STOP face; and ~~or~~ a series of eight or more small ~~white or~~ yellow~~
206 ~~lights no larger than 1/4 inch in diameter along the outer edge of the paddle, arranged in~~
207 ~~a diamond pattern along the border of the SLOW face with one light at each point of the~~
208 ~~diamond; or~~

209 ~~E. B. A series of white lights forming the shapes of the letters in the legend.~~

210 **Standard:**

211 06 ~~If flashing lights are used on the STOP face of the paddle, their colors shall be all white~~
212 ~~or all red. If flashing lights are used on the SLOW face of the paddle, their colors shall be~~
213 ~~all white or all yellow.~~

214 ~~0706~~ If more than eight flashing lights are used, the lights shall be arranged such that they
215 clearly convey the octagonal shape of the STOP face of the paddle and/or the diamond
216 shape of the SLOW face of the paddle.
217 ~~0807~~ If flashing lights are used on the STOP/SLOW paddle, the flash rate shall be at least
218 50, but not more than 60, flashes per minute.
219 ~~0908~~ Flags, when used, shall be red or fluorescent orange/red in color, shall be a minimum
220 of 24 inches square, and shall be securely fastened to a staff that is approximately 36 inches
221 in length.
222

223 **Section 6E.05 STOP/SLOW Automated Flagger Assistance Devices**

224 **Standard:**

225 04 The AFAD's STOP/SLOW sign shall be supplemented with active conspicuity devices
226 by incorporating either:

- 227 A. White or red flashing lights within the STOP face and white or yellow flashing
228 lights within the SLOW face meeting the provisions contained in Section 6E.03; or
- 229 B. A Stop Beacon (see Section 4L.05) mounted a maximum of 24 inches above the
230 STOP face and a Warning Beacon (see Section 4L.03) mounted a maximum of 24
231 inches above, below, or to the side of the SLOW face. The Stop Beacon shall not be
232 flashed or illuminated when the SLOW face is displayed, and the Warning Beacon
233 shall not be flashed or illuminated when the STOP face is displayed. Except for the
234 mounting locations, the beacons shall comply with the provisions of Chapter 4L.

235 05 To inform road users to stop, the AFAD shall display the STOP face and the red or
236 white lights, if used, within the STOP face shall flash or the Stop Beacon shall flash. To
237 inform road users to proceed, the AFAD shall display the SLOW face and the yellow or
238 white lights, if used, within the SLOW face shall flash or the Warning Beacon or the Type
239 B warning lights shall flash.
240

241 **PART 7. TRAFFIC CONTROL FOR SCHOOL AREAS**

242 **CHAPTER 7D. CROSSING SUPERVISION**

243 **Section 7D.05 Operating Procedures for Adult Crossing Guards**

244 **Standard:**

245 01 Adult crossing guards shall not direct traffic in the usual law enforcement regulatory
246 sense. In the control of traffic, they shall pick opportune times to create a sufficient gap in
247 the traffic flow. At these times, they shall stand in the roadway to indicate that pedestrians
248 are about to use or are using the crosswalk, and that all vehicular traffic must stop.

249 02 Adult crossing guards shall use a STOP paddle. The STOP paddle shall be the primary
250 hand signaling device.

251 03 The STOP (R1-1) paddle shall be an octagonal shape. The background of the STOP
252 face shall be red with at least 6-inch series upper-case white letters and border. The paddle
253 shall be at least 18 inches in size and have the word message STOP on both sides. The
254 paddle shall be retroreflectorized or illuminated when used during hours of darkness.

255 Option:
256
257

258 04 The STOP paddle may be modified to improve conspicuity by incorporating white or red
259 flashing lights on both sides of the paddle. ~~Among the types of flashing lights that may be used~~
260 ~~are individual LEDs or groups of LEDs.~~
261 05 ~~The white or red flashing lights or LEDs may be~~ arranged in any either of the following
262 patterns:
263 ~~A. Two white or red lights centered vertically above and below the STOP legend,~~
264 ~~B. Two white or red lights centered horizontally on each side of the STOP legend,~~
265 ~~C. One white or red light centered below the STOP legend,~~
266 ~~D. A.~~ A series of eight or more small ~~white or red lights having a no larger than~~ diameter of
267 1/4 inch diameter ~~or less~~ along the outer edge of the paddle, arranged in an octagonal
268 pattern at the eight corners of the border of the STOP paddle face ~~(more than eight~~
269 ~~lights may be used only if the arrangement of the lights is such that it clearly conveys~~
270 ~~the octagonal shape of the STOP paddle);~~ or
271 ~~E. B.~~ A series of white lights forming the shapes of the letters in the legend
272 **Standard:**
273 06 05 **If flashing lights are used on the STOP paddle, the flash rate shall be at least 50, but no**
274 **more than 60 flashes periods per minute.**