

# National Committee on Uniform Traffic Control Devices

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Attachment No.: 8  
Item No.: 18B-RW-02

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

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**TECHNICAL COMMITTEE:** Regulatory and Warning Signs Technical Committee and Signals Technical Committee  
**ITEM NUMBER:** 18B-RW-02  
**TOPIC:** R10-YY, LEFT (RIGHT) TURN YIELD ON FLASHING YELLOW ARROW signs for signals with permissive left (right) turns  
**ORIGIN OF REQUEST:** Pooled Fund Study (December 2017) and RW and SIG Technical Committees Joint Task force: Bob Seyfried RWSTC (chair), Erin Kissner (RWSTC), Lee Roadifer (RWSTC), Jeff Wolfe (RWSTC), Robert Weber (RWSTC), and Gerry DeCamp (STC)  
**AFFECTED SECTIONS OF MUTCD:** Sections 2B.53

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### DEVELOPMENT HISTORY:

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- Task force: 6-20-18, revised 11-21-18, revised 1-9-19
  - Approved by RW Technical Committee: 06/20/2018
  - Approved by SIGNAL Technical Committee 06/20/2018
  - Approved by RW Technical Committee following sponsor comments: 01/09/2019
  - Approved by SIGNAL Technical Committee following sponsor comments: NA
  - Approved by NCUTCD Council: 01/10/2019

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*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 through the federal rulemaking process.*

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### SUMMARY:

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The Traffic Control Devices Pooled Fund Study (TCD PFS) focused on a systematic evaluation of novel traffic control devices (TCDs), employing a process that addressed human factors and operations issues for each TCD idea. As part of the TCD PFS effort, the Federal Highway Administration (FHWA) Human Factors Team evaluated both existing and proposed traffic signs. Sets of sign alternatives were evaluated for driver comprehension and legibility. For some sets, participants were also asked to rank the effectiveness of the alternatives.

30 The LEFT (RIGHT) TURN YIELD ON FLASHING YELLOW sign is intended to be used to  
 31 inform drivers that they are expected to yield at a flashing yellow traffic signal. It is challenging  
 32 to adequately convey dynamic “flashing” in a static symbol. The Pooled Fund Study investigated  
 33 the most appropriate symbol to portray a flashing yellow arrow. Although the Pooled Fund Study  
 34 limited its evaluation to only left turn applications for such a sign, the Joint Task Force  
 35 considered it reasonable to make such a sign also applicable to right turns on flashing yellow  
 36 arrows where it is desired to remind turning drivers to yield to pedestrians in the crosswalk or to  
 37 U-turns on the cross street.

38  
 39 **DISCUSSION**

40 The following table presents all alternatives for the flashing yellow arrow sign that were  
 41 evaluated by the Pooled Fund Study. In each case, the alternative sign was placed next to the  
 42 appropriate signal face. A condition in which no sign was placed next to the signal face was also  
 43 included. This was designed to provide insight as to whether or not the sign is necessary to  
 44 properly interpret the signal.  
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**Table 11. Flashing Yellow Arrow Sign Alternatives Selected for Evaluation**

Alt. 1	Alt. 2	Alt. 3	Alt. 4
			<p data-bbox="1133 1016 1256 1050">(no sign)</p>

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 48 **Comprehension**

49 Participants were only exposed to a single Flashing Yellow Arrow sign and were asked “Imagine  
 50 you are driving and encounter this sign. You want to make a left turn and are positioned in the  
 51 proper lane. How would you proceed?” The sign was placed in context next to the signal face on  
 52 the mast arm. The yellow arrow was presented as flashing, in a solid state, and blank. Open  
 53 ended responses were coded as a response including the acknowledgement that the driver did not  
 54 have the right of way and needed to watch for oncoming traffic, as a need to use caution only, or  
 55 some other response.

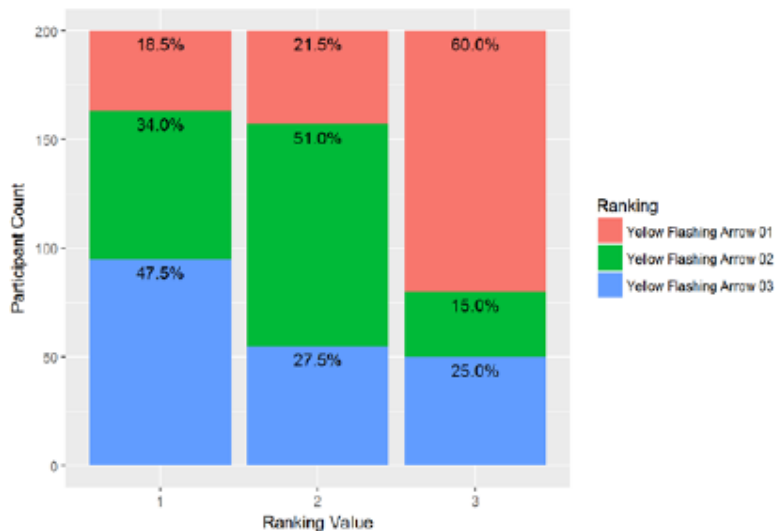
56  
 57 Participant responses as percentages are presented in Table 12. When exploring all data, no  
 58 significant differences between sign alternatives were found, nor was there a significant  
 59 interaction between the flashing state of the signal mast and the sign alternative ( $p > .05$ ).  
 60 However, the flashing state of the signal was found to significantly affect response. Significantly  
 61 more people who saw the animated flashing yellow arrow verbally indicated that they did not  
 62 have the right of way and needed to yield to oncoming traffic ( $p < .05$ ). This result lends one to  
 63 believe that the flashing of the light itself carries meaning to drivers.

**Table 12. The percentage of participant responses within each coded category for each alternative, by flashing state.**

Flashing state	Sign Alternative	Yield to oncoming traffic %	Use Caution Only %	Other %
Off	Alt. 1	80	0	20
	Alt. 2	65	10	25
	Alt. 3	75	5	25
	Alt. 4	65	20	15
On (steady)	Alt. 1	65	20	15
	Alt. 2	75	5	20
	Alt. 3	60	20	20
	Alt. 4	45	30	25
Animated (flashing)	Alt. 1	70	30	0
	Alt. 2	100	0	0
	Alt. 3	85	5	10
	Alt. 4	70	30	0

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Next, participants were told the intended meaning of the flashing yellow arrow sign. The three sign alternatives were presented (i.e., no blank sign was shown for ranking) and participants were asked to rank them in terms of perceived effectiveness. When considering only the top choice indicated by the participants (Ranking = 1), alternative 3 was selected as the top choice by 47.5 percent (95/200) of the participants and alternative 2 was selected as the top choice by 34 percent (68/200) of the participants. There was a significant difference in the rankings of each alternative  $\chi^2(4) = 121.44, p < .001$ . Alternative 1 (all text) was consistently rated the least effective sign ( $p < .05$ )



**Figure 2. The percentage of participants selecting each sign alternative at each ranking value.**

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78 **Legibility**

79 Mean legibility response distances are presented in Table 13. Mean response distance did not  
80 vary significantly by sign alternative  $F(2) = .80$ ,  $MSe = 3455.212$ ,  $p > .05$ . In other words, all  
81 signs were read at a similar distance.

82

**Table 13. Mean response distance by sign alternative.**

Alternative	Mean Distance (ft)
Alt. 1	376.07
Alt. 2	379.38
Alt. 3	389.97

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85 **Summary Findings for Flashing Yellow Arrow**

86 There were no significant differences between sign alternatives, nor was there a significant  
87 interaction between the flashing state of the signal face and sign alternative. Regardless of sign  
88 alternative or flashing state, between 75-100 percent of participants reported that the driver  
89 needed to yield to oncoming traffic or use caution; this was also true for participants who viewed  
90 alternative 4 (no sign), signifying that even with no sign at all, people would either choose to  
91 yield to oncoming traffic or use caution. The results also indicated that significantly more people  
92 who saw the animated flashing yellow arrow verbally indicated that they did not have the right of  
93 way and needed to yield to oncoming traffic. This is important because it suggests that the  
94 flashing light carries meaning to drivers.

95

96 When considering the participant rankings of the signs, participants generally preferred  
97 alternative 3 and alternative 2 over alternative 1. All three signs had similar legibility distances.  
98 Although there were no statistically significant differences, more participants selected alternative  
99 3 as their top choice than those who selected alternative 2, and alternative 3 also had a slightly  
100 longer legibility distance (though, again, not significant).

101

102 With only 70 percent of participants reporting that they need to yield to oncoming traffic when  
103 viewing the animated flashing yellow arrow with no sign, the Pooled Fund Study concluded that  
104 it may be premature to not use a sign at all. However, there may be a point in the future where  
105 the signs will not be needed, or can be removed after a certain period of time. Alternative 3 or  
106 alternative 2 are both acceptable signs to use.

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108 As a result, it is recommended that a LEFT (RIGHT) TURN YIELD ON FLASHING YELLOW  
109 sign be added to the MUTCD for optional use in conjunction with flashing left-turn YELLOW  
110 ARROW and flashing right-turn YELLOW ARROW signal faces. Because alternatives 2 and 3  
111 performed approximately equally, either could be used. However, because Alternative 2 Thad  
112 100% correct responses when used in conjunction with a flashing yellow arrow, it is  
113 recommended by the Task Force for addition to the MUTCD.

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115 Although the RIGHT TURN YIELD ON FLASHING YELLOW sign was not considered in the  
116 pooled fund study, the task force believes that the message is sufficiently similar to the LEFT  
117 TURN YIELD ON FLASHING YELLOW sign to warrant its inclusion in the recommended  
118 MUTCD changes. This sign could be useful at locations where a flashing yellow arrow is

119 desirable to indicate to right-turning motorists that they must yield to pedestrians or U-turning  
120 vehicles.

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## 122 **RECOMMENDED MUTCD CHANGES**

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124 The following present the proposed changes to the current MUTCD within the context of the  
125 current MUTCD language. Proposed additions to the MUTCD are shown in blue underline and  
126 proposed deletions from the MUTCD are shown in ~~red strikethrough~~. Changes previously  
127 approved by NCUTCD Council (but not yet adopted by FHWA) are shown in green double  
128 underline for additions and ~~green double strikethrough~~ for deletions. In some cases, background  
129 comments may be provided with the MUTCD text. These comments are indicated by  
130 highlighted light blue in brackets.

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## 132 **Chapter 2B. REGULATORY SIGNS, BARRICADES, AND GATES**

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### 134 **Section 2B.53 Traffic Signal Signs (R10-5 through ~~R10-30~~ ~~R10-XX~~ R10-YY)**

#### 135 Option:

136 01 To supplement traffic signal control, Traffic Signal signs R10-5 through ~~R10-30~~ R10-YY  
137 may be used to regulate road users (see Figure 2B-27).

138 02—~~Traffic Signal signs (see Figure 2B-27) may be installed at certain locations to clarify signal~~  
139 ~~control~~. Among the legends that may be used for this purpose are: ~~LEFT ON GREEN ARROW~~  
140 ~~ONLY (R10-5), STOP HERE ON RED (R10-6 or R10-6a) for observance of stop lines, DO~~  
141 ~~NOT BLOCK INTERSECTION (R10-7) for avoidance of traffic obstructions, USE LANE(S)~~  
142 ~~WITH GREEN ARROW (R10-8) for obedience to lane use control signals (see Chapter 4M),~~  
143 ~~LEFT TURN YIELD ON GREEN (symbolic circular green) (R10-12), and LEFT TURN YIELD~~  
144 ~~ON FLASHING RED ARROW AFTER STOP (R10-27).~~ Change the above list of legends from  
145 paragraph format to a bulleted list for better clarity and insert the new LEFT (RIGHT) TURN  
146 YIELD ON FLASHING (symbolic yellow arrow) sign below

- 147 • LEFT ON GREEN ARROW ONLY (R10-5),
- 148 • STOP HERE ON RED (R10-6 or R10-6a),
- 149 • DO NOT BLOCK INTERSECTION (R10-7),
- 150 • USE LANE(S) WITH GREEN ARROW (R10-8), (see Chapter 4M),
- 151 • LEFT TURN YIELD ON GREEN (symbolic circular green) (R10-12),
- 152 • LEFT (RIGHT) TURN YIELD ON FLASHING (symbolic yellow arrow)
- 153 • (R10-YY or R10-YYa), or
- 154 • LEFT (RIGHT) TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27  
155 or R10-27a)

#### 156 Guidance:

157 03 *If used, the LEFT ON GREEN ARROW ONLY (R10-5) sign, the LEFT TURN YIELD ON*  
158 *GREEN (symbolic circular green) (R10-12) sign, LEFT TURN YIELD ON FLASHING (symbolic*  
159 *yellow arrow) (R10-YY) sign, or the LEFT TURN YIELD ON FLASHING RED ARROW AFTER*  
160 *STOP (R10-27) sign should be located adjacent to the left-turn signal face. If used, the RIGHT*  
161 *TURN YIELD ON FLASHING (symbolic yellow arrow) (R10-YYa), or the RIGHT TURN YIELD*  
162 *ON FLASHING RED ARROW AFTER STOP (R10-27a) sign should be located adjacent to the*  
163 *right-turn signal face.*

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165 Option:  
166 04 If needed for additional emphasis, ~~any of the signs described in paragraph 02 above an~~  
167 ~~additional LEFT TURN YIELD ON GREEN (symbolic circular green) (R10-12) sign~~ with an  
168 AT SIGNAL (R10-31P) supplemental plaque (see Figure 2B-27) may be installed in advance of  
169 the intersection.

170 05 In situations where traffic control signals are coordinated for progressive timing, the Traffic  
171 Signal Speed (I1-1) sign may be used (see Section 2H.03).

172 **Standard:**

173 06 **The CROSSWALK STOP ON RED (symbolic circular red) (R10-23) sign (see Figure**  
174 **2B-27) shall only be used in conjunction with pedestrian hybrid beacons (see Section**  
175 **4F.02).**

176 07 **The EMERGENCY SIGNAL (R10-13) sign (see Figure 2B-27) shall be used in**  
177 **conjunction with emergency-vehicle traffic control signals (see Section 4G.02).**

178 08 **The EMERGENCY SIGNAL—STOP ON FLASHING RED (R10-14 or R10-14a) sign**  
179 **(see Figure 2B-27) shall be used in conjunction with emergency-vehicle hybrid beacons (see**  
180 **Section 4G.04).**

181 Option:

182 09 In order to remind drivers who are making turns at a signalized intersection to yield to or  
183 stop for pedestrians, a Turning Vehicles Yield to (Stop for) Pedestrians (R10-15, R10-15a) sign  
184 (see Figure 2B-27) may be used.

185 **Standard:**

186 09a The Turning Vehicles Stop for Pedestrians (R10-15a) sign shall only be used in  
187 jurisdictions where laws, ordinances or resolutions specifically require that a driver must  
188 stop for a pedestrian. (approved by Council 1/06/2017)

189 Option:

190 10 A U-TURN YIELD TO RIGHT TURN (R10-16) sign (see Figure 2B-27) may be installed  
191 near the left-turn signal face if U-turns are allowed on a protected left-turn movement on an  
192 approach from which a right-turn GREEN ARROW signal indication is simultaneously being  
193 displayed to drivers making a right turn from the conflicting approach to their left.

194 10a A U-TURN SIGNAL (R10-XX) sign (see Figure 2B-27) may be installed adjacent to the  
195 signal face that exclusively controls a u-turn movement. (approved by Council 6/20/2009)

197 **ADD sign R10-15a to Figure 2B.27. Add \* fluorescent yellow-green background color may**  
198 **be used instead of yellow for this sign. (approved by Council 1-6-2017)**



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**Figure 2B-27 Traffic Signal Signs and Plaques**



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206 ((add U-TURN SIGNAL sign (R10-xx)) (approved by Council June 20, 2009))

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208 Add the following sign to Figure 2B-27:



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210 LEFT (RIGHT) TURN YIELD ON FLASHING (*symbolic yellow arrow*) sign (R10-YY or R10-

211 YYa)

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