



**National Committee on
Uniform Traffic Control Devices**

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RWSTC Agenda Item IV.3 June 2014

**National Committee on Uniform Traffic Control Devices
RWSTC RECOMMENDATION**

**TECHNICAL COMMITTEE: NCUTCD Regulatory/Warning Signs Technical
Committee**

DATE OF ACTION: (TASK FORCE): May 30, 2014
**TASK FORCE: Dan Paddick (chair), Tom Heydel, Mark Bott, Scott Kuznicki, Fred
Ranck, Dave Woosley, James Sullivan, Jason Kennedy**
RWSTC APPROVAL DATE: 6-26-14
**TRANSMITTAL TO SPONSORS DATE: NOT APPLICABLE DUE TO NPA
DEADLINE**
COUNCIL APPROVAL DATE: June 28, 2014

TOPIC: Intersection Conflict Warning Systems

AFFECTED PORTIONS OF MUTCD: Section 1A.13 and Section 2C.XX

BACKGROUND:

Jon Jackels of MnDOT gave a presentation on Intersection Conflict Warning Systems (ICWS) to the Regulatory and Warning Sign Technical Committee (RWSTC) and other Technical Committees of the National Committee on Uniform Traffic Control Devices (NCUTCD) at its June 2012 meeting. The focus of this presentation was the work being performed through the ENTERPRISE Transportation Pooled Fund (TPF-5(231)) study. The RWSTC formed this Task Force after this presentation.

Discussions at the January 2013 RWSTC meeting resulted in the consensus opinion that:

- 1) It should be emphasized that all ICWS signs and sign placements should conform to the principles of the MUTCD

42 2) That the RWSTC wanted the Enterprise study to determine based on solid
43 research, which signs are the best signs. The RWSTC would then propose the
44 addition of these signs to the MUTCD.
45

46 This position was reconfirmed at the June 2013 meeting.
47

48 In an effort to have material available for the 2015 MUTCD, the RWSTC modified
49 its position on these points at its January 2014 meeting. Instead the Task Force is to use
50 the ongoing research to identify successful signs that that meet the basic requirements of
51 the MUTCD. Then, once identified by the Task Force, prepare material to include in the
52 MUTCD for these signs. The use of these signs will be presented as an Option statement.
53

54 The following summary of signs and accident history was then compiled. It should
55 be noted that the studies, as best as can be determined are "simple before/after studies".
56 This means that no control sites were used and regression to the mean has not been
57 addressed.
58

59 The Pooled Fund Study entitled Evaluation of Low Cost Safety Improvements (TPF-
60 5(099)) (ELCSF) is also collecting and analyzing the data on Intersection Conflict
61 Warning Systems. They should be producing some data in the near future.
62

63 **Signs on Major Road**

64 *North Carolina*

65 VEHICLE ENTERING (WHEN FLASHING) Majority included WHEN FLASHING
66 2 and 4 lane divided roadways, Diamond signs with flashing beacons
67 CRF total 32.5%, Frontal 32.1% Injury 26.8% Severe Injury 30.1%
68
69

70 *North Carolina* (May be some of the same sites as above)

71 VEHICLE ENTERING (WHEN FLASHING)
72 2 and 4 lane divided roadways, Diamond signs with flashing beacons
73 4 sites 2 Lane with 2 lane side road simple before and after CRF 46.1%
74 7 Sites 4 Lane with 2 lane side road simple before and after CRF 19.9%
75

76 *Missouri*

77 WATCH FOR ENTERING TRAFFIC or VEHICLES ENTERING WHEN FLASHING
78 Rectangular signs with flashing beacons. Divided and undivided. Four way and T
79 intersections. All at 2 lane side roads. Nine locations
80 Simple before and after CRF total 28%, Angle 37%, Severe 72%, Severe Angle 75%
81

82 **Signs on Minor Road**

83 *North Carolina*

84 VEHICLE ENTERING (WHEN FLASHING)
85 WATCH FOR APPROACHING VEHICLES
86 Overhead at intersection
87

88 Simple before and after CRF total 3.5%, frontal impact +4.3%

89

90 Iowa and Missouri

91 TRAFFIC APPROACHING WHEN FLASHING

92 Diamond sign with flashing beacons placed 50 to 70 feet to left of intersection. Sign

93 placement not in general conformance with principles of MUTCD. Night time

94 illumination and washout issues need to be considered.

95 Simple before and after CRF total 32%, Angle 44%, Severe 33%, Severe Angle 8%

96

97 Missouri

98 TRAFFIC APPROACHING WHEN FLASHING

99 Diamond sign with flashing beacons. Divided and undivided. Four way and T

100 intersections. Sign on far side of intersection(?). Ten locations

101 Simple before and after CRF total 29%, Angle 36%, Severe 29%, Severe Angle 28%

102

103 Minnesota

104 Side Road: LOOK FOR TRAFFIC WHEN FLASHING

105 Thru Road: “Intersection” warning sign

106 Four locations, all four way single lane

107 Formal before and after being included in ELCSI-PFS

108 Unofficial simple before and after CRF total 59%

109 **NOTE: Being removed summer of 2014.** Being replaced with diamonded shaped

110 VMS with ENTERING TRAFFIC legend and WHEN FLASHING plaque.

111

112 Minnesota

113 Modified R6-3 “Divided Highway” message board sign. LED red slash circle and

114 vehicle indication on occupied approach.

115 No signing on thru roadway

116 Three locations, all four way, two through lanes on major, single lane approaches on side

117 road.

118 Formal before and after being included in ELCSI-PFS

119 Unofficial simple before and after CRF total 60%

120 **NOTE: Being removed summer of 2014.** Being replaced with diamonded shaped

121 VMS with ENTERING TRAFFIC legend and WHEN FLASHING plaque.

122

123 Wisconsin

124 Divided 4 lane road with 2 lane side road (one lane approach)

125 Modified R6-3 “Divided Highway” message board sign. LED red slash circle and

126 vehicle indication on occupied approach.

127 Before After accident analysis incomplete

128

129 **Signs on both Major and Minor**

130

131 Missouri

132 Major Road: WATCH FOR ENTERING TRAFFIC or VEHICLES ENTERING WHEN
133 FLASHING Rectangular signs with flashing beacons Divided and undivided. Four way
134 and T intersections. All at 2 lane side roads.
135 Minor Road: TRAFFIC APPROACHING WHEN FLASHING Diamond sign with
136 flashing beacons.
137 Eight locations Simple before and after CRF total 28%, Angle 37%, Severe 48%, Severe
138 Angle 53%

139

140 Minnesota

141 Side Road: LOOK FOR TRAFFIC **NOTE: Being removed summer of 2014.** Being
142 replaced with diamond shaped VMS with ENTERING TRAFFIC legend and WHEN
143 FLASHING PLAQUE
144 Thru Road: ENTERING TRAFFIC WHEN FLASHING
145 Five locations, all four way single lane
146 Formal before and after being included in ELCSI-PFS
147 Unofficial simple before and after CRF total 52%,
148

149

149 Pennsylvania

150 Major Road: Diamond “Intersection” with LED cars on side road, VMS with TRAFFIC
151 Ahead message and 25 MPH advisory speed panel
152 Side Road: VMS with CROSSING TRAFFIC legend and car symbols
153 Two locations, Five years before and after data. No change in number of accidents at one
154 location. Increase from 6 crashes to 11 crashes at the other.
155

156

156 Maine

157 Main Road: Rectangular overhead TRAFFIC ENTERING WHEN FLASHING sign with
158 flashing beacons
159 Side Road: Diamond shaped ground mounted VEHICLE ENTERING with what looks
160 like a rectangular panel with LED FROM RIGHT and FROM LEFT legends
161

162

162 **Signs Used**

163

164 Main Road

- 165 1. VEHICLE ENTERING
- 166 2. VEHICLES ENTERING WHEN FLASHING
- 167 3. ENTERING TRAFFIC WHEN FLASHING
- 168 4. TRAFFIC ENTERING WHEN FLASHING
- 169 5. WATCH FOR ENTERING TRAFFIC

170

171 Side Road

- 172 1. TRAFFIC APPROACHING WHEN FLASHING
- 173 2. LOOK FOR TRAFFIC WHEN FLASHING
- 174 3. VEHICLE ENTERING (WHEN FLASHING)
- 175 4. LOOK FOR TRAFFIC **NOTE: Being removed summer of 2014.**
- 176 5. Diamond shaped ground mounted VEHICLE ENTERING with what looks like a
177 rectangular panel with LED FROM RIGHT and FROM LEFT legends

- 178 6. Modified R6-3 “Divided Highway” message board sign. LED red slash circle and
179 vehicle indication on occupied approach. **NOTE: Being removed summer of**
180 **2014.**
- 181 7. Diamonded shaped VMS with ENTERING TRAFFIC legend and WHEN
182 FLASHING plaque
183
184

185 **DISCUSSION:**

186
187 There was general consensus on the task force that the accident data was adequate to
188 justify some form of signing on both through road and side road applications.
189

190 On the through road installations there was considerable disagreement on whether the
191 WHEN FLASHING wording should be included. One side believed that it was necessary
192 to include WHEN FLASHING. Otherwise it would not be an ICWS installation. It
193 would just be another intersection warning sign to use. Drivers would be on their own to
194 recognize that the sign did not always flash and to recognize the significance of the flash.
195

196 The other faction believed that the WHEN FLASHING was unnecessary and opened
197 up the liability issue when the system either failed to detect the side road vehicle or was
198 in some other system failure. The task force favored VEHICLES ENTERING WHEN
199 FLASHING and WATCH FOR ENTERING TRAFFIC.
200

201 There was also considerable support to use a large rectangular sign rather than the
202 traditional diamond shaped warning sign. This would distinguish the installation from a
203 normal warning sign installation.
204

205 On the side road approach three signs were favored. They were LOOK FOR
206 TRAFFIC WHEN FLASHING, TRAFFIC APPROACHING WHEN FLASHING and
207 WATCH FOR APPROACHING VEHICLES. There is no accident data available for the
208 WATCH FOR APPROACHING VEHICLES sign. Again there is the question of
209 whether to use the WHEN FLASHING portion of the legend. The issue is the same. Is it
210 an ICWS sign or just another warning sign? Is the sign applicable if there is a detection
211 system failure?
212

213 It is the task force’s position that both of these positions have validity and it is the
214 users responsibility to choose the position that they want to take.
215

216 The use of LED and VMS in ICWS installations adds more dimensions and
217 complexity to the situation. The task force has decided to table these type of installations
218 to a future date.
219

220 **RECOMMENDATION:**

222 Intersection Conflict Warning Systems are being used throughout the Country. There
223 is a need for the NCUTCD to provide some guidance on the signs being used. The use of
224 these signs are optional.

225

226 Add the TRAFFIC ENTERING WHEN FLASHING sign and the WATCH FOR
227 ENTERING TRAFFIC sign to the MUTCD for use in ICWS installations on the through
228 roadway. Provide for the use of the traditional diamond shaped sign and a large
229 rectangular sign.

230

231 Add the TRAFFIC APPROACHING WHEN FLASHING and WATCH FOR
232 APPROACHING VEHICLES signs to the MUTCD for use in ICWS installations on the
233 side road approach.

234

235

236 **Note: Proposed changes to the MUTCD are shown in underline red and removed**
237 **text are shown in ~~strikethrough red~~.**

238

239

240 **RECOMMENDED WORDING:**

241

242 **Section 1A.13 Definitions of Headings, Words and Phrases in this Manual**

243

244 Add a new definition to paragraph 03

245

246 **XYZ. Intersection Conflict Warning System (ICWS) – A system of signs, vehicle**
247 **detection, and either flashing warning beacons or active sign element(s)**
248 **installed at or near an intersection to provide real-time information about**
249 **intersection conditions.**

250

251 **Section 2C.XY Intersection Conflict Warning System Signs (WX-U through WX-Z)**

252 **Support:**

253 **01 Intersection Conflict Warning Systems are typically installed to address crashes**
254 **associated with driver inattention, restricted sight distance, and gap selection at stop**
255 **controlled intersections.**

256

257 **Option:**

258 **02 TRAFFIC ENTERING (WHEN FLASHING) (WX-U1 or WX-U2) sign or a**
259 **WATCH FOR ENTERING TRAFFIC (WX-V1 or WX-V2) sign (see Figure 2C-X) or**
260 **similar message may be used on the through roadway approach to a side road stop**
261 **controlled intersection as part of an Intersection Conflict Warning System to warn of**
262 **entering traffic from the side road.**

263 **The sign may be in diamond or rectangular format. [note: place holder for illustration]**

264

265 **03 The TRAFFIC APPROACHING (WHEN FLASHING) (WX-Y1 OR WX-Y2) sign or**
266 **the WATCH FOR APPROACHING VEHICLES (WX-Z) sign or similar message (see**

267 Figure 2C-X) may be used on the side road stop controlled approach of an Intersection
268 Conflict Warning System to warn of approaching traffic on the through road.

269

270 **Standard:**

271 **04 When used as part of an Intersection Conflict Warning System, the TRAFFIC**
272 **ENTERING (WHEN FLASHING) sign, the WATCH FOR ENTERING TRAFFIC**
273 **sign, the TRAFFIC APPROACHING WHEN FLASHING sign, and the WATCH**
274 **FOR APPROACHING VEHICLES sign or similar message shall be supplemented**
275 **with an active warning system that activates when an approaching vehicle is**
276 **detected.**

277

278 **(add designs to Figure 2C-9 Intersection Warning Signs)**

279

280 RWSTC VOTE 6-26-14: For: 23 Opposed: 2 Abstentions:1

281

282 COUNCIL VOTE: 6-28-14 Approved For: 35 Opposed: 0 Abstentions: 2

283

284 C:\nctcd\June 2014\Intersection Conflict Warning System (ICWS) approved by
285 RWSTC 6-26-14, approved by COUNCIL 6-28-14