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2 **ATTACHMENT NO. 7**

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4 **RW # 6, January 2011**

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7 **National Committee on Uniform Traffic Control Devices**
8 **RWSTC RECOMMENDATION FOLLOWING SPONSOR COMMENTS**

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

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13 **DATE OF ACTION: (TASK FORCE) 11-22-09, revised 12-14-09, revised 12-16-09,**
14 **updated to 2009 MUTCD 12-19-09, revised 12-20-09, revised 1-6-10, Revised 5-16-**
15 **10, Revised 5-17-10, Revised 5-30-10, revised 1-10-11 after sponsor comments**

16 **TASK FORCE: Tom Heydel (chair), Dave Woosley, Mark Bott, Scott Kuznicki**

17 **RWSTC APPROVAL DATE: June 30, 2010**

18 **TRANSMITTAL TO SPONSORS DATE: October 28, 2010**

19 **RWSTC APPROVAL FOLLOWING SPONSOR COMMENTS: Jan 19, 2011**

20 **COUNCIL APPROVAL DATE: 1-20-11**

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22 **TOPIC: Spacing of Speed Limit signs**

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24 **AFFECTED PORTIONS OF MUTCD: Section 2B.13 (2009 MUTCD).**

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26 **DISCUSSION:**

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28 The MUTCD in Section 2B.13 of the 2009 MUTCD requires that speed limit signs be
29 posted at points of change from one speed limit to another, beyond major intersections
30 and at other locations where it is necessary to remind road users of the speed limit that is
31 applicable (2009 MUTCD). Also, at entrances to the State, where appropriate, and at
32 jurisdictional boundaries in urban areas (2009 MUTCD). Section 7 of the MUTCD
33 provides for school speed limit sign locations.

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35 The MUTCD is silent on repetition of speed limit signs to inform road users of the speed
36 limit or as reminders. Many states have their own supplemental guidance but may or
37 may not be based on actual studies.

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39 A research project presented to the TRB 87th Annual Meeting called “Motorists Memory
40 for the Speed Limit” by Inman, Miller, Tackett, Molino, and Zineddin discussed this
41 topic and what the proper interval should be.

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43 Two considerations seem to be predominant: 1) speed limits need to be repeated more
44 frequently in urban settings than in rural, and 2) repetition of speed limit signs is
45 important when the speed limit is less than the norm for the class of road that is being

46 signed. Beyond these general principles, there is little consistency in the specific
47 guidance that is provided.

48
49 They concluded that the maximum effective spacing for display components is less than
50 7 miles. The effective spacing was 5 miles based on the 85th percentile performance. The
51 recall at 5 mile spacing was always greater than 80%. This was on a freeway
52 application.

53
54 Some of the states shown in the report and their guidance is as follows:

- 55 1. Alaska requires intermediate speed limit signs “at least once every two minutes of travel time” on
56 urban roads.(2) On rural roads, Alaska requires speed limit signs be placed no more than ten
57 minutes apart, except on low volume rural roads, where there are no speed limit changes, the signs
58 may be up to 30 minutes apart.
- 59 2. Arizona provides guidance for the spacing of speed limit signs on rural roads.(3) Where the speed
60 limit is less than 55 mph (86 km/h) the recommended maximum spacing is given by the formula S
61 $= V/6$, where S is the maximum distance between speed limit signs in miles and V is the speed
62 limit in miles per hour. In rural areas where the speed limit is 55 mph or greater, the formula is
63 modified to $S = V/5$.
- 64 3. California requires speed limit signs on freeways with limits of 65 or 70 mph (105 or 112 km/h)
65 to be no more than 25 miles (37 km) apart.(4) Where the freeway speed limit is reduced to 55 mph
66 (86 km/h), speed limit signs are to be no more than 3 mi (5 km) apart. On conventional roads the
67 maximum spacing between speed limit signs is no more than 5 to 10 miles (8 to 16 km).
- 68 4. Minnesota allows speed limit signs to be repeated at intervals of 60 seconds of travel at the posted
69 speed where speed is reduced. (5) The repetition may be less in dense urban areas. The maximum
70 spacing between speed limit signs in rural areas is 10 miles (16 km).
- 71 5. Where a roadway speed limit is restricted relative to the state speed limit, New York requires a
72 second speed limit sign within 1100 ft (336 m) of the first. (6) Subsequently speed limit signs are
73 to be placed no further apart than 100 times the posted speed limit (e.g., for a restricted speed of
74 35 mph (56 km/h) the maximum separation is 3500 ft (1068 m)).
- 75 6. In Pennsylvania, where special speed limits are in effect, the spacing between speed limit signs
76 must be no more that 0.5 miles. (7)

77
78 Two approaches to the analyses were undertaken: a numerical analysis and a subjective
79 analysis. The data for the numerical analysis was vehicle speed, which was sampled
80 every 0.5 seconds during each scenario. The extent between each pair of speed limit
81 signs, excluding the sign at the beginning, was divided into four quarters of equal length.
82 The median speed for each quarter was then calculated. These medians could then be
83 averaged across participants to provide a summary of the responses to speed limit signs.

84
85 The subjective analysis consisted of three independent observers classifying plots of
86 drivers’ speed profiles. These profiles were graphs of the running mean speed for the
87 preceding 5 seconds. An example of such a plot is shown in Figure 3. The observers rated
88 performance on each segment on a 6 point nominal scale. The ratings were:

- 89 1. Compliant (within ± 5 mi/h (8 km/h) of the posted speed).
 - 90 2. Compliant 50 to 85 percent of the distance, otherwise faster.
 - 91 3. Compliant 50 to 85 percent of the distance, otherwise slower.
 - 92 4. Driving more than 5 mi/h above the speed limit more than 50 percent of the distances.
 - 93 5. Driving more than 5 mi/h below the speed limit more than 50 percent of the distances.
 - 94 6. Did not appear to see the speed limit sign.
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Conclusions: The MUTCD should include a guidance statement that jurisdictions should develop and establish a policy for the spacing of speed limit signs. The Traffic Control Devices Handbook should include suggested criteria for jurisdictions to reference in their spacing of speed limit signs policy. The reference to the handbook rather than an option statement in the MUTCD would provide for spacing of speed limit signs but allow for urban versus rural, low speed versus high speed, and freeway versus conventional highway or city street.

RECOMMENDATION:

Based on recommended practices by various states and the TRB report, the following language should be addressed in the next edition of the Traffic Control Devices Handbook.

Jurisdictions may consider establishing speed limit sign spacing criteria based on the type of facility and speed limit as follows:

Per Section 2B.13 of the 2009 MUTCD, speed limit signs shall be placed beyond major intersections, end of a section to which speed limit applies, and at statutory speed limits at entrances to State and where appropriate, at jurisdictional boundaries in urban areas.

In addition to Section 2B.13 of the MUTCD, the following spacing of reminder signs to provide for proper enforcement is recommended:

- A. Freeways – beyond the entrance ramps associated with each interchange, beginning and ending of a freeway section, and at the approximate midway point between the interchanges where interchange spacing exceeds 25 miles.
- B. Expressways – beyond the entrance ramps associated with each interchange, beginning and ending of an expressway section, after major intersections, and the approximate midway point between the interchange or intersection where the spacing exceeds 25 miles.
- C. Rural roadways – High Speed (55 MPH and higher) – reminder signs approximately every 10 miles.
- D. Rural roadways – Intermediate High Speed (45 MPH and 50 MPH) —reminder signs approximately every 2 miles.
- E. Rural roadways – Low Speed (40 MPH and lower) - reminder signs approximately every 1 mile.
- F. Urban Arterials –
 - 35 MPH and lower – Maximum spacing approximately ¼ mile
 - 40 and 45 MPH - Maximum spacing approximately ½ mile
 - 50 MPH, 55 MPH and higher – Maximum spacing approximately 1 mile
- G. Urban Collector Streets
 - 40 MPH and lower – Maximum spacing of approximately ¼ mile
 - 45 MPH – Maximum spacing of ½ mile where average intersection spacing exceeds ¼ mile

142 50 MPH and over – not typical for urban collectors. See Urban Arterials for
143 spacing for 50 MPH and over.

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145 It is recommended that high speed be considered as 45 MPH and higher.

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148 **Note: Proposed changes to the 2009 MUTCD are shown in underline red and**
149 **removed text are shown in ~~strikethrough red~~.**

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151 **RECOMMENDED WORDING:**

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153 **Section 2B.13 Speed Limit Sign (R2-1)**

154 **Standard:**

155 **Speed zones (other than statutory speed limits) shall only be established on the basis of**
156 **an engineering study that has been performed in accordance with traffic engineering**
157 **practices. The engineering study shall include an analysis of the current speed distribution**
158 **of free-flowing vehicles.**

159 **The Speed Limit (R2-1) sign (see Figure 2B-3) shall display the limit established by law,**
160 **ordinance, regulation, or as adopted by the authorized agency based on the engineering**
161 **study. The speed limits displayed shall be in multiples of 5 mph.**

162 **Speed Limit (R2-1) signs, indicating speed limits for which posting is required by law,**
163 **shall be located at the points of change from one speed limit to another.**

164 **At the downstream end of the section to which a speed limit applies, a Speed Limit sign**
165 **showing the next speed limit shall be installed. Additional Speed Limit signs shall be**
166 **installed beyond major intersections and at other locations where it is necessary to remind**
167 **road users of the speed limit that is applicable.**

168 **Speed Limit signs indicating the statutory speed limits shall be installed at entrances to**
169 **the State and, where appropriate, at jurisdictional boundaries in urban areas.**

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171 **Support:**

172 In general, the maximum speed limits applicable to rural and urban roads are established:

- 173 A. Statutorily – a maximum speed limit applicable to a particular class of road, such as
174 freeways or city streets, that is established by State law; or
175 B. As altered speed zones – based on engineering studies.

176 State statutory limits might restrict the maximum speed limit that can be established on a
177 particular road, notwithstanding what an engineering study might indicate.

178 **The Traffic Control Devices Handbook contains suggested criteria on the spacing of speed**
179 **limit signs**

180
181 **Option:**

182 If a jurisdiction has a policy of installing Speed Limit signs in accordance with statutory
183 requirements only on the streets that enter a city, neighborhood, or residential area to indicate the
184 speed limit that is applicable to the entire city, neighborhood, or residential area unless otherwise
185 posted, a CITYWIDE (R2-5aP), NEIGHBORHOOD (R2-5bP), or RESIDENTIAL (R2-5cP)
186 plaque may be mounted above the Speed Limit sign and an UNLESS OTHERWISE POSTED
187 (R2-5P) plaque may be mounted below the Speed Limit sign (see Figure 2B-3).

188 *Guidance:*

189 *A Reduced Speed Limit Ahead (W3-5 or W3-5a) sign (see Section 2C.38) should be used to*
190 *inform road users of a reduced speed zone where the speed limit is being reduced by more than*
191 *10 mph, or where engineering judgment indicates the need for advance notice to comply with the*
192 *posted speed limit ahead.*

193 *States and local agencies should conduct engineering studies to reevaluate non-statutory*
194 *speed limits on segments of their roadways that have undergone significant changes since the last*
195 *review, such as the addition or elimination of parking or driveways, changes in the number of*
196 *travel lanes, changes in the configuration of bicycle lanes, changes in traffic control signal*
197 *coordination, or significant changes in traffic volumes.*

198 *No more than three speed limits should be displayed on any one Speed Limit sign or*
199 *assembly.*

200 *When a speed limit within a speed zone is posted, it should be within 5 mph of the 85th-*
201 *percentile speed of free-flowing traffic.*

202

203 *Guidance:*

204 *Speed studies for signalized intersection approaches should be taken outside the influence area*
205 *of the traffic control signal, which is generally considered to be approximately 1/2 mile, to*
206 *avoid obtaining skewed results for the 85th-percentile speed.*

207

208 *Support:*

209 **Advance warning signs and other traffic control devices to attract the motorist's attention**
210 **to a signalized intersection are usually more effective than a reduced speed limit zone.**

211

212 *Guidance:*

213 *An advisory speed plaque (see Section 2C.08) mounted below a warning sign should be used*
214 *to warn road users of an advisory speed for a roadway condition. A Speed Limit sign should not*
215 *be used for this situation.*

216 *Option:*

217 *Other factors that may be considered when establishing or reevaluating speed limits are the*
218 *following:*

219 *A. Road characteristics, shoulder condition, grade, alignment, and sight distance;*

220 *B. The pace*

221 *C. Roadside development and environment;*

222 *D. Parking practices and pedestrian activity; and*

223 *E. Reported crash experience for at least a 12-month period.*

224 *Two types of Speed Limit signs may be used: one to designate passenger car speeds,*
225 *including any nighttime information or minimum speed limit that might apply; and the other to*
226 *show any special speed limits for trucks and other vehicles.*

227 *A changeable message sign that changes the speed limit for traffic and ambient conditions*
228 *may be installed provided that the appropriate speed limit is displayed at the proper times.*

229 *A changeable message sign that displays to approaching drivers the speed at which they are*
230 *traveling may be installed in conjunction with a Speed Limit sign.*

231 *Guidance:*

232 If a changeable message sign displaying approach speeds is installed, the legend YOUR
233 SPEED XX MPH or such similar legend should be displayed. The color of the changeable
234 message legend should be a yellow legend on a black background or the reverse of these colors.

235 Support:

236 Advisory Speed signs and plaques are discussed in Sections 2C.08 and 2C.14. Temporary
237 Traffic Control Zone Speed signs are discussed in Part 6. The WORK ZONE (G20-5aP) plaque
238 intended for installation above a Speed Limit sign is discussed in Section 6F.12. School Speed
239 Limit signs are discussed in Section 7B.15.

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241 RWSTC VOTE: For: Unanimous

242 Opposed:

243 Abstentions:

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245 COUNCIL VOTE: For: 36

246 Opposed: 0

247 Abstentions: 1

248 approved January 20, 2011

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252 c: NCUTCD/January 2011 meeting/RW # 6 Spacing of Speed Limit signs 11-22-09,
253 revised 12-14-09, revised 12-16-09, updated 12-19-09, revised 12-20-09, revised 1-6-10 ,
254 revised 5-16-10 , revised 5-17-10, 5-30-10, revised 6-30-10, revised 1-10-11 following
255 sponsor comments, 1-19-11, revised 1-20-11 approved by council

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