



National Committee on Uniform Traffic Control Devices

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Item No: 20A-RW-02

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

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TECHNICAL COMMITTEE: RWSTC Committee
ITEM NUMBER: 20A-RW-02
TOPIC: Speed Advisory Signs for Changes in Horizontal Alignment

ORIGIN OF REQUEST: Joe Caruso, Rieker, Inc.
Task force: Bob Seyfried (chair), Dan Paddick, Herman Hill

**AFFECTED SECTIONS
OF MUTCD:** 2C.08, 2C.09, and 2C.13

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DEVELOPMENT HISTORY: 12-22-19, updated 12-26-19

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- Approved by Technical Committee: 01/08/2020
 - Approved by Technical Committee following sponsor comments: xx/xx/xxxx
 - Approved by NCUTCD Council: TBD

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This is a proposal for recommended changes to the MUTCD that has been developed by a technical committee of the NCUTCD. The NCUTCD is distributing it to its sponsoring organizations for review and comment. Sponsor comments will be considered in revising the proposal prior to NCUTCD Council consideration. This proposal does not represent a revision of the MUTCD and does not constitute official MUTCD standards, guidance, or options. If approved by the NCUTCD Council, the recommended changes 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.

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SUMMARY:

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At the June 2019 meeting of the RWSTC, Mr. Joe Caruso (Rieker, Inc.) made a PowerPoint presentation which highlighted potential shortcomings in the current text of the MUTCD regarding methods for determining advisory speeds for changes in horizontal alignments.

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Following is a summary of his suggestions:

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- Add “Geometric Determination” and use of the “Speed Equation” as established methods for determining advisory speeds.
 - Clarify lateral acceleration limits for trucks.
 - Clarify lateral acceleration limits for speeds above 50 or 60 mph.
 - Clarify rounding methods.
 - Clarify lateral acceleration limits with “circular logic.”
 - Clarify Chevron spacing contradictions in Table 2C-6.
 - Remove or fix the Curve Advisory Speed spreadsheet.

- 35 • Establish equipment standards, certification, calibration frequency requirements, and
- 36 accuracy standards for the inclinometer and GPS sensors.
- 37 • Establish ball-bank indicator standards.
- 38 • Strengthen the language for removal of non-conforming signs.

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40 DISCUSSION

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42 The Task Force considered these suggestions and has proposed the following responses:

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- 44 1. Add “Geometric Determination” and use of the “Speed Equation” as established methods
- 45 for determining advisory speeds.
- 46 a. Section 2C.08 was previously amended by the NCUTCD to eliminate reference to any
- 47 specific methods of determining advisory speeds, and simply references the Traffic
- 48 Control Devices Handbook for guidance on methodology. No further change is
- 49 recommended.
- 50 2. Clarify lateral acceleration limits for trucks.
- 51 a. Section 2C.13 was previously amended by the NCUTCD to eliminate reference to any
- 52 specific methods of determining advisory speeds, and simply references the Traffic
- 53 Control Devices Handbook for guidance on methodology. No further change is
- 54 recommended.
- 55 3. Clarify lateral acceleration limits for speeds above 50 or 60 mph.
- 56 a. Same response as Item 1.
- 57 4. Clarify rounding methods.
- 58 a. Same response as Item 1.
- 59 5. Clarify lateral acceleration limits with “circular logic.”
- 60 a. Same response as Item 1.
- 61 6. Clarify Chevron spacing contradictions in Table 2C-6.
- 62 a. Use of dual criteria for determining Chevron spacing (advisory speed and curve radius)
- 63 in Table 2C-6 is potentially confusing to users and result in conflicting guidance.
- 64 Because advisory speed may vary for a given curve radius depending on superelevation,
- 65 and because advisory speed is the key criterion for determining warning sign
- 66 applications for changes in horizontal alignment in Table 2C-5, it is recommended that
- 67 Table 2C-6 be amended to delete reference to curve radius, and make advisory speed
- 68 the sole determinant of Chevron spacing.
- 69 7. Remove or fix the CAS spreadsheet.
- 70 a. Same response as Item 1.
- 71 8. Establish equipment standards, certification, calibration frequency requirements, and
- 72 accuracy standards for the inclinometer and GPS sensors.
- 73 a. Same response as Item 1.
- 74 9. Establish ball-bank indicator standards
- 75 a. Same response as Item 1.
- 76 10. Strengthen the language for removal of non-conforming signs.
- 77 a. The Introduction to the MUTCD (page I-3) states:
- 78 i. **“After the effective date of a new edition of the MUTCD or a revision thereto,**
- 79 **or after the adoption thereof by the State, whichever occurs later, new or**
- 80 **reconstructed devices installed shall be in compliance with the new edition or**
- 81 **revision.**

- 82 ii. Unless a particular device is no longer serviceable, non-compliant devices on
83 existing highways and bikeways shall be brought into compliance with the
84 current edition of the National MUTCD as part of the systematic upgrading of
85 substandard traffic control devices (and installation of new required traffic
86 control devices) required pursuant to the Highway Safety Program, 23 U.S.C.
87 §402(a). The FHWA has the authority to establish other target compliance
88 dates for implementation of particular changes to the MUTCD [23 CFR
89 655.603(d)(1)]. These target compliance dates established by the FHWA shall
90 be as shown in Table I-2.”

- 91 11. Table I-2 indicates that the Target Compliance Date for Horizontal Alignment Warning
92 Signs (2C.06 through 2C.14) December 31, 2019. Therefore, all advisory speed signs that
93 are not in compliance should have already been replaced. Since the Target Compliance
94 Dates apply to numerous devices in the MUTCD, it would be inappropriate to add language
95 to the MUTCD that is only applicable to replacement of Horizontal Alignment warning
96 signs. No change is recommended.

97 98 RECOMMENDED MUTCD CHANGES 99

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

107 108 CHAPTER 2C. WARNING SIGNS AND OBJECT MARKERS 109

110 Section 2C.08 Advisory Speed Plaque (W13-1P)

111 Option:

112 01 The Advisory Speed (W13-1P) plaque (see Figure 2C-1) may be used to supplement any
113 warning sign to indicate the advisory speed for a condition.

114 **Standard:**

115 02 **The use of the Advisory Speed plaque for horizontal curves shall be in accordance with**
116 Section 2C.06a the information shown in Table 2C-5. The Advisory Speed plaque shall also
117 be used where an engineering study indicates a need to advise road users of the advisory
118 speed for other roadway conditions.

119 03 If used, the ~~The~~ Advisory Speed plaque shall carry the message XX MPH. The speed
120 displayed shall be a multiple of 5 mph.

121 04 Except in emergencies or when the condition is temporary, an Advisory Speed plaque
122 shall not be installed until the advisory speed has been determined by an engineering study.

123 05 The Advisory Speed plaque shall only be used to supplement a warning sign and shall
124 not be installed as a separate sign installation.

125 06 The advisory speed shall be determined by an engineering study that follows
126 established engineering practices.

127 Support

128 See Section 1A.04, Traffic Control Devices Handbook for established engineering
129 practices

NOTE: Edit committee changed Section 1A.11 to be 1A.04 for publications.

Support:

~~07 Among the established engineering practices that are appropriate for the determination of the recommended advisory speed for a change in horizontal alignment horizontal curve are the following:~~

- ~~A. An accelerometer that provides a direct determination of side friction factors~~
- ~~B. A design speed equation~~
- ~~C. A traditional ball bank indicator or other equivalent device using the following criteria:~~
 - ~~1. 16 degrees of ball bank for speeds of 20 mph or less~~
 - ~~2. 14 degrees of ball bank for speeds of 25 to 30 mph~~
 - ~~3. 12 degrees of ball bank for speeds of 35 mph and higher~~

~~08 The 16, 14, and 12 degrees of ball bank criteria are comparable to the current AASHTO horizontal curve design guidance. Research has shown that drivers often exceed existing posted advisory curve speeds by 7 to 10 mph.~~

Guidance:

- 09 The advisory speed should be determined based on free-flowing traffic conditions.*
- 10 Because changes in conditions, such as roadway geometrics, surface characteristics, or sight distance, might affect the advisory speed, each location should be evaluated periodically or when conditions change.*

(Approved by Council June 22, 2018, 17B-RW-01)

Section 2C.09 Chevron Alignment Sign (W1-8)

Standard:

01 The use of the Chevron Alignment (W1-8) sign (see Figures 2C-1 and 2C-2) to provide additional emphasis and guidance for a change in horizontal alignment shall be in accordance with the information shown in Table 2C-5.

Option:

02 When used, Chevron Alignment signs may be used instead of or in addition to standard delineators. (approved by Council January 19, 2012, attachment # 8, RW #8)

Standard:

03 The Chevron Alignment sign shall be a vertical rectangle. No border shall be used on the Chevron Alignment sign.

04 If used, The Chevron Alignment signs shall be installed on the outside of a turn or curve, in line with and at approximately a right angle to approaching traffic. Chevron Alignment signs shall be installed at a minimum height of 4 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way.

Option:

04a LEDs may be used to enhance chevron signs and, if vehicle activated the LEDs may be flashed concurrently but not sequentially within the sign panel.

Standard:

04b The LEDs used in the chevron alignment sign shall consist of yellow LEDs outlining the chevron symbol. (approved by Council June 28, 2014, RW # 3, Attachment # 1)

Guidance:

05 The approximate spacing of Chevron Alignment signs on the turn or curve measured from the point of curvature (PC) should be as shown in Table 2C-6.

Table 2C-6. Typical Spacing of Chevron Alignment Signs on Horizontal Curves

Advisory Speed	Curve Radius	Sign Spacing
15 mph or less	Less than 200 feet	40 feet
20 to 30 mph	200 to 400 feet	80 feet
35 to 45 mph	401 to 700 feet	120 feet
50 to 60 mph	701 to 1,250 feet	160 feet
More than 60 mph	More than 1,250 feet	200 feet

~~Note: The relationship between the curve radius and the advisory speed shown in this table should not be used to determine the advisory speed.~~

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06 If used, Chevron Alignment signs should be visible for a sufficient distance to provide the road user with adequate time to react to the change in alignment.

Standard:

07 Chevron Alignment signs shall not be placed on the far side of a T-intersection facing traffic on the stem approach to warn drivers that a through movement is not physically possible, as this is the function of a Two-Direction (or One-Direction) Large Arrow sign.

08 Chevron Alignment signs shall not be used to mark obstructions within or adjacent to the roadway, including the beginning of guardrails or barriers, as this is the function of an object marker (see Section 2C.63).

Section 2C.13 Truck Rollover ~~Warning~~ Sign (W1-13)

Option:

01 A Truck Rollover ~~Warning~~ (W1-13) sign (see Figure 2C-1) may be used to warn drivers of vehicles with a high center of gravity, such as trucks, tankers, and recreational vehicles, of a curve or turn where geometric conditions might contribute to a loss of control and a rollover as determined by an engineering ~~study~~ judgment.

~~Support:~~

~~02 Among the established engineering practices that are appropriate for the determination of the truck rollover potential of a horizontal curve are the following:~~

- ~~A. An accelerometer that provides a direct determination of side friction factors~~
- ~~B. A design speed equation~~
- ~~C. A traditional ball bank indicator using 10 degrees of ball bank~~

(Approved by Council June 22, 2018, 17B-RW-01)

Standard:

03 If a Truck Rollover ~~Warning~~ (W1-13) sign is used, it shall be accompanied by an Advisory Speed (W13-1P) plaque indicating the recommended speed for vehicles with a higher center of gravity

Support:

See Section 1A.04, Traffic Control Devices Handbook for use of Truck Rollover sign.

NOTE: Edit committee changed Section 1A.11 to be 1A.04 for publications. (Approved by Council June 22, 2018, 17B-RW-01)

Option:

04 The Truck Rollover ~~Warning~~ sign may be displayed as a static sign, as a static sign supplemented by a ~~flashing~~ warning beacon, or as a ~~driver feedback~~ ~~changeable message~~ LED sign activated by the detection of an approaching vehicle with a high center of gravity that is

214 traveling in excess of the recommended speed for the condition. The driver feedback LED sign
215 may be yellow LEDs in the warning sign border or a flashing advisory speed legend in the
216 advisory speed plaque.

217 Guidance:

218 04a The driver feedback LED sign should be a yellow LED legend on a black opaque
219 background displaying the vehicle speed approaching the change in horizontal alignment. The
220 detected speed should have a steady or flashing message displaying the vehicle speed
221 approaching the change in horizontal alignment. (approved by Council June 28, 2014, RW # 3,
222 Attachment # 1)

223 Option

224 04b An additional Truck Rollover sign may be placed in advance of the initial Truck Rollover
225 sign.

226 Guidance:

227 04c The location of the additional Truck Rollover sign should be determined by engineering
228 judgment.

229 Standard

230 04d If an additional Truck Rollover sign is used, it shall be accompanied by an advisory
231 speed plaque and either by a distance plaque or a RAMP plaque.

232 Support:

233 05 The curved arrow on the Truck Rollover ~~Warning~~ sign shows the direction of roadway
234 curvature. The truck tips in the opposite direction.

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236 Figure 2C-12

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238 Add:



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241 (Paragraphs 04b, 04c, 04d and ramp plaque in Section 2C.13 items above were approved by
242 Council 6-30-17, 17A-RW-04)

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244 C:\nctcd\january 2020\Determining advisory speed on curves 12-22-19, revised 12-26-19, 1-8-20 READY FOR SPONSORS