

Curve Speed signs be removed from the STANDARD and OPTION statements. The FHWA disagrees because this is a helpful sign to remind drivers of the advisory speed. Most curves are very well outlined with delineators or chevron signs. Because crashes are still occurring on curves, the FHWA believes that there is a need to remind drivers of the recommended reduction in speed as they proceed along the curve or ramp. The FHWA includes this statement, as well as other references to the Curve Speed sign, in this final rule.

The FHWA also adds a new paragraph to the OPTION stating that, based on engineering judgment, the Curve Speed sign may be installed on the inside or the outside of the curve to enhance its visibility. The FHWA incorporates this new paragraph in this final rule to be consistent with changes elsewhere in Part 2 of the MUTCD.

The FHWA also adds a new figure numbered and titled "Figure 2C-7 Example of Advisory Speed Signing for an Exit Ramp." This figure illustrates the use of the Exit Speed sign along the deceleration lane and the use of the Ramp Speed signs along the actual ramp. The figure clarifies application of these signs to jurisdictions. Based on editorial comments suggesting additional clarity to this figure, the FHWA adopts this new figure, with revisions, in this final rule.

Additionally, the FHWA adds to the OPTION statement at the end of the section, that the advisory speed may be the 85th percentile speed of free-flowing traffic, the speed corresponding to a 16-degree ball-bank indicator reading,<sup>20</sup> or the speed otherwise determined by an engineering study due to unusual circumstances. The wording of this paragraph in this final rule incorporates comments received from the NCUTCD, the Kansas DOT, a traffic engineering consultant and private citizens on the proposed wording in the NPA, specifically the ball-bank test. The FHWA includes this OPTION criteria to enhance the uniformity of determining the recommended advisory speed and to provide additional warning to motorists, because highway curves have a crash rate about three times the rate for highway tangent segments and a run-off-the-road crash rate about four times the tangent segment rate. The FHWA also adds a new SUPPORT statement that further describes the ball-bank indicator reading and its correlation with the 85th percentile speed, based on research

conducted for the Maryland Department of Transportation.<sup>21</sup>

82. In Section 2C.37 Intersection Warning Signs (W2-1 through W2-6) (numbered Section 2C.34 in the NPA), the FHWA changes the design of the CIRCULAR INTERSECTION (W2-6) sign to a symbol sign with three rotating arrows to better portray the operations at circular intersections. The FHWA received eight comments from ATSSA, the City of Tucson, Arizona, traffic engineering consultants, and private citizens in support of the new sign design and six comments from the Kansas, Virginia, and Wisconsin DOTs as well as the City of Lenexa, Kansas, opposing it. The commenters who opposed suggested that road users may not understand the new sign and offered new designs, or stated that the sign in the 2000 MUTCD should be restored. The FHWA adopts the three-arrow sign as proposed in the NPA because it is consistent with the international symbol for a roundabout intersection and with FHWA roundabout design guidance<sup>22</sup> and has significantly longer recognition distance than the previous sign. The FHWA establishes a phase-in target compliance date of 10 years from the effective date of this final rule for existing signs in good condition to minimize any impact on State or local governments.

In order to educate road users, the FHWA clarifies the first paragraph of the OPTION statement to include that a TRAFFIC CIRCLE word message plaque may accompany the Circular Intersection (W2-6) sign installed in advance of a circular intersection.

Additionally, the FHWA modifies the GUIDANCE statement to clarify that the Intersection Warning signs, other than the Circular Intersection Warning symbol (W2-6) sign and the T-intersection symbol (W2-4) sign, should not be used on approaches controlled by STOP signs, YIELD signs, or signals. This change, which was suggested by the NCUTCD, allows the W2-4 sign to be used on the stem of a T-intersection, regardless of how the intersection is controlled, to provide additional warning information to road users.

83. The FHWA adds a new section numbered and titled, "Section 2C.39 Traffic Signal Signs (W25-1, W25-2)." (This section was numbered Section

2C.53 in the NPA.) This new section includes a STANDARD statement on the use of the ONCOMING TRAFFIC HAS EXTENDED GREEN (W25-1) and ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN (W25-2) traffic signal signs. The STANDARD statement requires that, unless a separate left-turn signal face is provided and is operated as described in Section 4D.06 Application of Steady Signal Indications for Left Turns, if the possibility exists that a CIRCULAR YELLOW signal indication could be displayed to an approach from which drivers are turning left permissively without the simultaneous display of a CIRCULAR YELLOW signal indication to the opposing approach (see Section 4D.05), either a W25-1 or a W25-2 sign be installed near the left-most signal head. The FHWA adds this new section because these signs are adopted in Chapter 4D as one of several ways to eliminate or reduce safety issues associated with the "yellow trap" (as described in the discussion of Section 4D.05) in some traffic signal phasing sequences. The FHWA received three comments from ATSSA, the City of Tucson, Arizona, and a traffic engineering consultant in support of this new section and associated signs, and many comments from the NCUTCD, State and local DOTs, and private citizens opposed to it. The proposed wording of the signs in the NPA, CAUTION ONCOMING GREEN EXTENDED (W25-1) and CAUTION ONCOMING GREEN MAY BE EXTENDED (W25-2), stimulated many comments from the NCUTCD, the Arizona DOT, Pierce County, Washington; the City of Plano, Texas; and the City of Los Angeles, California, regarding the use of the word "Caution," stating that the warning sign colors should communicate to the driver that caution is needed, rather than explicit use of the word. Many of these same commenters suggested that the public would not understand the signs, and some jurisdictions are opposed to allowing any situations in which the "yellow trap" can occur. The FHWA recognizes that there are some locations where no other signal sequence other than a yellow trap is reasonably feasible due to unique combinations of intersection geometrics, traffic volumes, and the like. The FHWA believes that these signs will serve a useful purpose, and revises the text of the signs to remove the word "Caution" and to clarify their meaning.

84. In Section 2C.40 Vehicular Traffic Signs (W8-6, W11-1, W11-5, W11-5a, W11-8, W11-10, W11-11, W11-12p,

<sup>21</sup> "Advisory Speeds on Maryland Highways—Technical Report", August 1999, by Brudis and Associates, Inc., is available from Brudis and Associates, 9220 Rumsey Road; Suite 110, Columbia, Maryland 21045, Phone (410) 884-3607.

<sup>22</sup> "Roundabouts: An Informational Guide," FHWA, 2000. Report Number: FHWA-RD-00-067 is available at the following URL: [www.fhrc.gov/safety/00068.htm](http://www.fhrc.gov/safety/00068.htm).

<sup>20</sup> The ball bank indicator reading is a measure of the overturning force (side friction), measured in degrees, on a vehicle negotiating a horizontal curve.