**ATTACHMENT NO. 6**
**RW Signs No. 3**

National Committee on
Uniform Traffic Control Devices

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**RWSTC June 2012 RW # 3**

**TOPIC:** Advance Traffic Control Signs
**TECHNICAL COMMITTEE:** Regulatory & Warning Signs Technical Committee

**STATUS/DATE OF ACTION:**
**TC Drafts:** 11/24/2011, 11/30/11, 12/01/11,5/14/12, 5/15/12
**TC Approval:** 01/18/2012
**Transmitted to Sponsors:** Spring 20120
**RWSTC approval following sponsors:** 6/20/12
**Council Approval:** **6-22-12**

**ORIGIN OF REQUEST:** Pline/Heydel & Ranck

**AFFECTED SECTIONS OF MUTCD:** Section 2C.36 **Advance Traffic Control Signs**
**Table 2C-4 . Guidelines for Advance Placement of Warning Signs**

**SUMMARY:**
The existing MUTCD provisions for Advance Traffic Control Signs refers to Table 2C-4 Guidelines for Advance Placement of Warning Signs as a reference to determine sufficient distance to permit a road user to respond to the control device at the intersection. The road user needs to see the STOP or YIELD sign in sufficient time to bring their vehicle to a stop at the intersection. This reference can lead to an improper determination of adequate visibility distance for a road user to decelerate to a stop condition. This road user requirement is reflected in the AASHTO Guidelines for Stopping Sight Distance..

**RESEARCH:**
The AASHTO Stopping Sight Distance is based on 2.5 seconds perception/reaction time exceeding the 90$^{th}$ percentile of all drivers. The vehicle stopping distance is documented in NCHRP 400 as providing a comfortable deceleration rate and adequate for wet pavements.

**DISCUSSION**
It is necessary that a road user observe the STOP or YIELD at the intersection, react, and decelerate to a stop condition. The AASHTO Stopping Sight Distance criteria is based on a 2.5 sec PRT and a deceleration rate of 11.2 ft/sec$^2$ for the various design

speeds representing the recommended minimum design guidelines for a comfortable stop. If the STOP or YIELD at the intersection is not visible at this distance in advance of the intersection then the road user would not have adequate time to react to the intersection traffic control and bring the vehicle to a stop. It would also be appropriate to install the Advance Traffic Control Sign (Stop Ahead or Yield Ahead) at this point of stopping sight distance to provide the road user notice of the stop condition so they can begin the deceleration to a stop. It is recognized that the Stop Ahead or Yield Ahead symbol sign has several hundred feet of legibility distance which when added to the AASHTO Stopping Sight Distance provides an additional warning distance for the road user and an opportunity to either react or decelerate at a slower rate than the minimum criteria. It is recommended that Table 2C-4 **Guidelines for the Advance Placement of Warning Signs** be revised to place the AASHTO Stopping Sight Distance minimum design guidelines in the "0" column or STOP condition for the various speeds. The basis for posting the Advance Traffic Control signs further in advance of the intersection are as follows;

1. It provides more advance notice of the critical intersection stop condition and a factor of safety for the driver to use more PRT or decelerate slower.
2. At 35 mph or less, Table 2C-4 assumes a sign legibility distance of 180 feet placing the Advance Traffic Control sign at 100 feet from the intersection. If that legibility distance does not exist then the motorist does not have adequate warning for stopping at the intersection.
3. Moving the Advance Traffic Control signs out away from the intersection is representative of Figure 2A-4 and 2A-5 (Note, Figure 2A-5 is currently being considered by the Council ) providing more space on the intersection approach for lane control and guide signing.

The existing visibility criteria for a traffic control signal is based on continuous view of at least two signal faces for the distance specified in Table 4D-2 below assuming a queue of 2 vehicles (50 feet), PRT = 3.0 seconds, deceleration @ 11.2 ft/sec$^2$ and design speed vs. assumed speed based on "Mokkapati, Naveen and H. G. Hawkins. Jr. Guidelines for Minimum Signal Sight Distance, Transportation Research Record 2020, TRB, Washington D.C., pages 40-46, 2007";

| MUTCD Table 4D-2. Minimum Sight Distances for Signal Visibility | | AASHTO Table 3-1 Stopping Sight Distance | |
|---|---|---|---|
| 85$^{th}$%ile Speed | Minimum Sight Distance | Design Speed | Design Distance |
| 20 mph | 175 feet | 20 mph | 115 feet |
| 25 mph | 215 feet | 25 mph | 155 feet |
| 30 mph | 270 feet | 30 mph | 200 feet |
| 35 mph | 325 feet | 35 mph | 250 feet |
| 40 mph | 390 feet | 40 mph | 305 feet |
| 45 mph | 460 feet | 45 mph | 360 feet |
| 50 mph | 540 feet | 50 mph | 425 feet |
| 55 mph | 625 feet | 55 mph | 495 feet |
| 60 mph | 715 feet | 60 mph | 570 feet |

Section 4D.12(04) *Guidance: provides, "The two primary signal faces as a minimum on each approach should be continuously visible to traffic approaching the traffic control*

*signal, from a point at least the minimum sight distance provided in Table 4D-2 in advance of and measured to the stop line."* It should be noted that this is a "*Guidance"* provision while Section 2C.36 makes the visibility criteria for a traffic signal specified in Table 4D-2 a **Standard** provision. It is appropriate to modify the existing **Standard , Section 2C.36(01),** Lines 118 & 119, to a *Guidance* provision to make Section 2C.36 and 4D.12 consistent. However, Section 4D.12 places the Traffic Signal Ahead Warning sign in conformance with Section 2C.36 that references Table 2C-4. Making the change in Table 2C-4 would also locate the Signal Ahead Warning sign the same distance as recommended for the Stop Ahead or Yield Ahead signs.

Other Sections of the MUTCD that refer to the application of Stop Ahead and Yield Ahead Warning signs are as follows;

Figure 2A-4B Relative Location of Regulatory, Warning and Guide Signs on Intersection Approaches.
Section 2B.10(01). STOP Sign or YIELD Sign Placement
Section 4D.12(07) Visibility, Aiming and Shielding of Signal Faces
Section 5C.04(01)(02) Stop Ahead and Yield Ahead Signs
Section 5F.04(02) STOP and YIELD Signs
Section 8B.05(01) Use of STOP or YIELD Signs without Crossbuck Signs at Highway-LRT Grade Crossings.
Section 8B.06(03) Grade Crossing Advance Warning Signs

In each Section, the cross reference is to Section 2C.36 for the need and placement of the Stop Ahead and Yield Ahead sign. Therefore, revision of these Sections is not necessary.

**RECOMMENDED MUTCD PROVISIONS/ REVISIONS:**
**Note: Proposed changes to the MUTCD are shown in Underlined Red and removed text are shown in ~~strike through red.~~**

**Section 2C.36 Advance Traffic Control Signs (W3-1, W3-2, W3-3, W3-4)**
**Standard:**
01 **The Advance Traffic Control symbol signs (see Figure 2C-6) include the Stop Ahead (W3-1), Yield Ahead (W3-2), and Signal Ahead (W3-3) signs. These signs shall be installed on an approach to a primary traffic control device that is not visible for a sufficient distance to permit the road user to respond to the device (see Table 2C-4).**

Support:
02 Figure 2A-4 and 2A-5 shows the typical placement of an Advance Traffic Control sign.
03 Permanent obstructions causing the limited visibility might include roadway alignment or structures. Intermittent obstructions might include foliage or parked vehicles.
*Guidance:*
*The visibility criteria for a traffic control signal should be based on having a continuous view of at least two signal faces for the distance specified in Table 4D-2.*
04 *Where intermittent obstructions occur, engineering judgment should determine the treatment to be implemented.*
Option:

05 An Advance Traffic Control sign may be used for additional emphasis of the primary traffic control device, even when the visibility distance to the device is satisfactory.
06 An advance street name plaque (see Section 2C.58) may be installed above or below an Advance Traffic Control sign.
07 A warning beacon may be used with an Advance Traffic Control sign.
08 A BE PREPARED TO STOP (W3-4) sign (see Figure 2C-6) may be used to warn of stopped traffic caused by a traffic control signal or in advance of a section of roadway that regularly experiences traffic congestion.

**Standard:**

09 **When a BE PREPARED TO STOP sign is used in advance of a traffic control signal, it shall be used in addition to a Signal Ahead sign and shall be placed downstream from the Signal Ahead (W3-3) sign.**

Option:

10 The BE PREPARED TO STOP sign may be supplemented with a warning beacon (see Section 4L.03).

*Guidance:*

11 *When the warning beacon is interconnected with a traffic control signal or queue detection system, the BE PREPARED TO STOP sign should be supplemented with a WHEN FLASHING (W16-13P) plaque (see Figure 2C-12).*

Support:

12 Section 2C.40 contains information regarding the use of a NO MERGE AREA (W4-5P) supplemental plaque in conjunction with a Yield Ahead sign.

## Table 2C-4. Guidelines for Advance Placement of Warning Signs

**Make the following revisions to the Table;**

| Posted or 85th-Percentile Speed | Advance Placement Distance[1] | |
|---|---|---|
| | Condition B: Deceleration to the listed advisory speed (mph) for the condition | |
| | **Current 0[3]** | **Recommended 0[3]** |
| 20 mph | 100 ft[6] | 115 ft |
| 25 mph | 100 ft[6] | 155 ft |
| 30 mph | 100 ft[6] | 200 ft |
| 35 mph | 100 ft[6] | 250 ft |
| 40 mph | 125 ft | 305 ft |
| 45 mph | 175 ft | 360 ft |
| 50 mph | 250 ft | 425 ft |
| 55 mph | 325 ft | 495 ft |
| 60 mph | 400 ft | 570 ft |
| 65 mph | 475 ft | 645 ft |
| 70 mph | 550 ft | 730 ft |
| 75 mph | 650 ft | 820 ft |

1 The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is appropriate for an alignment warning symbol sign. For Conditions A and B, warning signs with less than 6-inch legend or more than four words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.

2 Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2005 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.

3 Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs.The distances are based on the 2011 AASHTO Policy, Table 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second$_2$, ~~minus the sign legibility distance of 180 feet.~~

4 Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve,Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second$_2$, minus the sign legibility distance of 250 feet.

5 No suggested distances are provided for these speeds, as the placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other signs.

6 The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

RWSTC 6-20-12 Vote:
For: 18

Against: 1
Abstentions: 1

Council Vote: For: Unanimous
Against:
Abstentions:

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C:NCUTCD/June 2012/RW # 3 Stop ahead signs Table 2C-4 Placement of advance signs 6-22-12 APPROVED BY COUNCIL