

Attachment No. 3

SIGNALS NO.3

This recommendation
was approved by the
National Committee
Council on 01/19/07.

TECHNICAL COMMITTEE RECOMMENDATION

TECHNICAL COMMITTEE: Signals Technical Committee

DATE OF ACTION: September 20, 2006

TOPIC: **Proposed new Section 4D.07A, Application of Flashing Signal Indication for Right Turns**

ORIGIN OF REQUEST: Signals Technical Committee

DISCUSSION: Discussion: NCHRP Projects 3-54 and 3-54(2) evaluated left-turn displays associated with exclusive left-turn lanes for protected/permissive left-turn control. NCHRP Report 493 recommends that a flashing yellow left arrow be included in the MUTCD as an option to the circular green indication for protected/permissive left-turn operation. The National Committee Council has adopted the flashing yellow left arrow as an alternate display to the traditional circular green for permissive and protected/permissive left turns.

The flashing yellow left arrow was adopted as an alternate display for permissive left turns because it tends to convey in a more obvious way the need to exercise caution when seeking gaps in opposing through traffic and yielding to pedestrians.

With the adoption of the flashing yellow left arrow, it is a natural progression to consider the use of the flashing yellow right arrow, as an alternate display to the traditional circular green indication. Conceptually, the flashing yellow right arrow could be used in special situations where there are conflicts with pedestrians crossing during the WALK and pedestrian clearance intervals. These special situations might include restricted visibility of pedestrians; a higher speed ("soft") right turn; at "T" intersections where there is no through movement (as might be implied by a circular green indication); or where the opposing leg is an off-ramp or one-way approaching street. In these situations, it is believed that the flashing yellow right arrow would provide a more obvious display to motorists to exercise caution.

Accordingly, the Signals Technical Committee recommends that the National Committee Council submit proposed MUTCD changes to the sponsors for comments.

COMMITTEE ACTIONS:

This item was discussed at the June 2006 STC meeting and the members supported sending it to sponsors. However, time during the meeting did not permit the development of proposed text. The STC decided to develop the proposed text and submit it to the STC members for an e-mail vote that, if successful, would permit sponsor review and comments prior to the January 2007 meeting. This planned action was reported to the National Committee Council as part of the STC report on June 30.

The Chapter 4D task force prepared the proposed new text and it was distributed to the STC members for their review and vote. A minimum of 23 votes was required to represent a quorum of the 44 STC members. Twenty-eight votes were received with 26 voting "for".

The recommended MUTCD change is on the following pages. All of the text is new so no underline or strikethrough is shown.

VOTE:

For	-	26
Opposed	-	2
Abstentions	-	0

**REFERENCE TO AFFECTED
PAGE NUMBERS IN MUTCD:**

Not in 2003 Edition of MUTCD, Rev. 1. New section proposed to be added following Section 4D.07.

Note: No changes were made at the January 2007 meeting in the information that was sent to sponsors

Note: All of the following Section 4D.07A is proposed new text.

Section 4D.07A Application of Flashing Signal Indications for Right Turns

I. General

Support:

This Section describes the optional use of a flashing right-turn YELLOW ARROW signal indication (instead of a steady CIRCULAR GREEN signal indication) during steady mode (stop-and-go) operation to control permissive right-turning movements from an intersection approach. There are no provisions in this Section or any other Section that require that a flashing right-turn YELLOW ARROW signal indication be used instead of a steady CIRCULAR GREEN signal indication to control permissive right-turning movements from an intersection approach. The selection of the flashing right-turn YELLOW ARROW signal indication alternative is a matter of engineering judgment.

There are three types of approaches to which this Section may be applied. They include approaches that have a separate right-turn lane, approaches that have a shared through and right-turn lane and approaches that have a shared left-turn and right-turn lane (such as at the stem of a "T" intersection). This Section also addresses a signal face which controls both right-turn lane(s) and adjacent through lanes.

Standard:

When this Section is applied to an intersection approach, it shall supersede all provisions contained in Section 4D.07. In no case shall the provisions of Section 4D.07 and the provisions of this Section be used in conjunction with each other for the same intersection approach. However, the use of the provisions of this Section for one or more approaches to a signalized intersection and the use of the provisions of Section 4D.07 for the other approaches to the same signalized intersection shall be permitted.

Support:

This Section sets forth Standards for the display of four types of messages to drivers intending to turn right from a signalized intersection approach:

- A. A message to stop, which is accomplished by displaying either:
 1. A steady right-turn RED ARROW signal indication that requires a driver to stop and await authorization to proceed; or
 2. A steady CIRCULAR RED signal indication that requires a driver to stop and await authorization to proceed under the rules as set forth in the applicable State Vehicle Code.

- B. A message to turn right in a protected manner, which is accomplished by displaying a steady right-turn GREEN ARROW signal indication.
- C. A message to turn right in a permissive manner, which is accomplished by displaying a flashing right-turn YELLOW ARROW signal indication.
- D. A message that the status of the right-turn operation is changing, which is accomplished by displaying a steady right-turn YELLOW ARROW signal indication or a steady CIRCULAR YELLOW indication (where the right-turn movement and through movement terminate concurrently) when the right-turn status is changing from:
 - 1. Protected to permissive; or
 - 2. Permissive to stopped; or
 - 3. Protected to stopped.

The display of a change interval when the status of the right-turn operation is changing from permissive to protected is prohibited.

Right-turn traffic is controlled by one of three modes as follows:

- A. Protected/Permissive Mode — both modes occur on an approach during the same signal cycle; or,
- B. Permissive Only Mode — turns made on the flashing right-turn YELLOW ARROW signal indication after yielding to conflicting traffic and pedestrians; or
- C. Protected Only Mode — turns made only when the steady right-turn GREEN ARROW signal indication is displayed.

It is not necessary that the right-turn mode for an approach always be the same throughout the day. Varying the right-turn mode on an approach among the permissive only and/or the protected/permissive and/or the protected only right-turn modes during different periods of the day is acceptable.

Standard:

The following paragraphs and the Option provision below shall apply when right-turn signal sections are provided for an approach under the provisions of this Section.

If the right-turn operating mode varies on an approach among the protected only mode, the permissive only mode, and/or the protected/permissive mode during various periods of the day, the requirements that are appropriate to that mode of operation shall be met.

When a signal face controlling a right-turn movement does not also control a through movement, a steady right-turn YELLOW ARROW signal indication shall be displayed immediately upon the termination of:

1. Every steady right-turn GREEN ARROW signal indication.
2. A flashing right-turn YELLOW ARROW signal indication if the permissive right-turn movement is being terminated and the right-turn signal face will subsequently display a steady red signal indication.

When a signal face controlling a right-turn movement also controls a through movement, a steady right-turn YELLOW ARROW signal indication or a CIRCULAR YELLOW signal indication (where the right-turn movement and through movement terminate concurrently) shall be displayed following:

1. Every steady right-turn GREEN ARROW signal indication.
2. Every flashing right-turn YELLOW ARROW that is not immediately followed by a steady right-turn GREEN ARROW.

When a permissive right-turn movement is changing to a protected right-turn movement, a steady right-turn GREEN ARROW signal indication shall be displayed immediately upon termination of the flashing right-turn YELLOW ARROW signal indication. A steady right-turn YELLOW ARROW signal indication or a CIRCULAR YELLOW indication shall not be displayed between the display of the flashing right-turn YELLOW ARROW signal indication and the display of the steady right-turn GREEN ARROW signal indication unless the green indication for the through movement is being terminated at the same time.

The minimum number of signal sections in a signal face controlling a right-turn movement shall be three and the maximum shall be five. Any signal section that is not displayed in any authorized sequence shall be omitted from the signal face, except that the minimum of three shall be maintained. (See Section 4D.xx).

A dual-arrow signal section, where used, shall display a steady GREEN ARROW for the protected movement and a flashing YELLOW ARROW for the permissive movement. All other uses of a dual signal section shall be prohibited.

During steady mode (stop-and-go) operation, the signal section that displays the steady right-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing right-turn YELLOW ARROW signal indication for permissive right turns.

During flashing mode operation (see Section 4D.12), the display of a flashing right-turn YELLOW ARROW signal indication shall be only from the signal section that displays the steady right-turn YELLOW ARROW change interval signal indication during steady mode (stop-and-go) operation.

During the protected right-turn movement, all other movements that would be in conflict with the right-turning traffic shall not be released into the intersection by any signal indication or other traffic control device.

Pedestrian signal heads controlling pedestrians crossing the lane or lanes used by a protected right-turn movement to depart the intersection shall display a

steady UPRAISED HAND (symbolizing DONT WALK) signal indication during the protected right-turn movement.

If an exclusive right-turn lane is present on the approach and if a right-turn signal face controlling only the right-turn movement is mounted over the roadway, the signal face shall not be positioned any further to the left than the lane line (or the extension of the lane line) between the right-turn lane and the adjacent through lane nor any further to the right than the right edge of the right-turn lane or lanes. Supplemental (additional) right-turn signal faces mounted over the roadway shall not be subject to these positioning requirements.

If an exclusive right-turn lane is present on the approach and if a signal face controlling both the right-turn movement and the adjacent through movement is mounted over the roadway, the signal face shall be positioned over the lane line (or the extension of the lane line) between the right-turn lane and the adjacent through lane. Supplemental (additional) signal faces, controlling both through and right-turn movements, mounted over the roadway shall not be subject to these positioning requirements.

Option:

Additional static signs or changeable message signs or other traffic control devices may be used to inform drivers that right-turn green arrows will not be available during certain times of the day.

II. Separate Right-Turn Lane with an Exclusive Signal Face Controlling Right Turns.

Standard:

For an approach with a separate right-turn lane, the required right-turn signal faces and operation shall be determined by the selected mode of right-turn operation, as follows:

- A. Protected/Permissive Mode – The signal indications for protected/permissive mode right turns shall be provided by a separate right-turn signal face that shall be capable of displaying, from top to bottom or left to right, one of the following sets of signal indications:**

Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, flashing right-turn YELLOW ARROW, and steady right-turn GREEN ARROW, or

Steady CIRCULAR RED, steady right-turn YELLOW ARROW, flashing right-turn YELLOW ARROW, and steady right-turn GREEN ARROW.

The display shall be a four-section signal face except that a three-section signal face containing a dual-arrow signal section as the bottom section shall be permitted where signal head height limitations will not permit the use of a four-section signal face.

The separate right-turn signal face shall meet the following requirements:

1. During the protected right-turn movement, the right-turn signal face shall display a steady right-turn GREEN ARROW signal indication.
 2. During the permissive right-turn movement, the right-turn signal face shall display a flashing right-turn YELLOW ARROW signal indication.
 3. If the right-turn signal face sometimes displays a steady CIRCULAR RED signal indication at a time when the signal faces for the adjacent through movement are not displaying steady CIRCULAR RED signal indications, the CIRCULAR RED signal indication for the right-turn signal face shall be shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s) or a RIGHT TURN SIGNAL sign (R10-XX) or a RIGHT TURN SIGNAL—YIELD ON FLASHING YELLOW (symbolic yellow arrow) (R10-yy) sign (see Figure 2B-19) shall be used.
- B. Permissive Only Mode — When the permissive only mode is the only right-turn mode used for an approach, the signal indications shall be provided as required by Paragraph A of this Standard except that the signal section that displays a steady GREEN ARROW indication shall be omitted.
- C. Protected Only Mode — If the protected only mode is the only right-turn mode used for an approach, the signal indications shall be provided as required by Paragraph A of this Standard except that the signal section that displays a flashing YELLOW ARROW indication shall be omitted.

III. Separate Right-Turn Lane with a Signal Face that also Controls Through Traffic.

Standard:

For an approach with a separate right-turn lane, the required signal sections in the signal head which controls the right-turn lane and the adjacent through lane shall be determined by the selected mode of right-turn operation, as follows:

- A. Protected/Permissive Mode—The signal indications for protected/permissive mode right turns shall be provided by a signal face that shall be capable of displaying one of the following sets of signal indications:

For a protected right turn which terminates prior to the termination of the through movement from top to bottom or left to right:

**Steady CIRCULAR RED
Steady CIRCULAR YELLOW
Steady CIRCULAR GREEN
Steady right-turn YELLOW ARROW
Dual-arrow right-turn signal section**

Or,

From top to bottom:

Steady CIRCULAR RED
Steady CIRCULAR YELLOW Steady right-turn YELLOW ARROW
Steady CIRCULAR GREEN Dual-arrow right-turn signal section

For a protected right turn which terminates concurrently with the through movement from top to bottom or left to right:

Steady CIRCULAR RED
Steady CIRCULAR YELLOW
Steady CIRCULAR GREEN
Flashing right-turn YELLOW ARROW
Steady right-turn GREEN ARROW

Or,

From top to bottom:

Steady CIRCULAR RED,
Steady CIRCULAR YELLOW
Steady CIRCULAR GREEN
Dual-arrow right-turn signal section

The signal face displays shall meet the following requirements:

1. During any interval when the CIRCULAR GREEN is displayed, either a flashing right-turn YELLOW ARROW indicating a permissive right-turn interval or a steady right-turn GREEN ARROW indicating a protected right-turn interval shall be displayed also, except during the change interval when a steady right-turn YELLOW ARROW shall be displayed to indicate a change from a protected turn interval to a permissive turn interval.
 2. The display of a protected or a permissive right-turn indication shall not be limited to intervals when the CIRCULAR GREEN is displayed.
 3. During the protected right-turn movement, the signal face shall display a steady right-turn GREEN ARROW signal indication.
 4. During the permissive right-turn movement, the signal face shall display a flashing right-turn YELLOW ARROW signal indication.
- B. Permissive Only Mode — When the permissive only mode is the only right-turn control mode used for an approach, the signal indications shall be provided as required by Paragraph A of this Standard, except that the dual-arrow right-turn signal section shall display only a flashing right-turn YELLOW ARROW indication or shall be replaced by a signal section that displays only a flashing right-turn YELLOW ARROW indication.

C. Protected Only Mode — If the protected only mode is the only right-turn mode used for an approach, the signal indications shall be provided as required by Paragraph A of this Standard with the following applicable exceptions:

- 1. Protected right turn which terminates prior to the termination of the through movement – The dual-arrow right-turn signal section shall display only a steady right-turn GREEN ARROW indication or shall be replaced by a signal section that displays only a steady right-turn GREEN ARROW indication.**
- 2. Protected right turn which terminates concurrently with the through movement –**
 - a. The dual-arrow right-turn signal section, if used, shall display only a steady right-turn GREEN ARROW or shall be replaced by a signal section that displays only a steady right-turn GREEN ARROW; or**
 - b. The flashing right-turn YELLOW ARROW signal section, if used, shall be deleted.**

IV. Shared Through and Right-Turn Lane

Standard:

For an approach with a shared through and right-turn lane, the required signal sections in the signal head which controls the shared lane shall be determined by the selected mode of right-turn operation, as discussed in III. above, except that the protected only Mode is not applicable.

V. Shared Left and Right-turn Lane

Standard:

For an approach with a shared left and right-turn lane, the required signal sections in the signal head which controls the shared lane shall be determined by the selected mode of operation, as follows:

- A. Protected/Permissive Mode—The signal indications for protected/permissive mode right turns shall be provided by a signal face that shall be capable of displaying one of the following sets of signal indications:**

From top to bottom or left to right:

**Steady CIRCULAR RED
Steady left-turn YELLOW ARROW
Dual-arrow left-turn signal section
Steady right-turn YELLOW ARROW
Dual-arrow right-turn signal section**

Or,

From top to bottom:

Steady CIRCULAR RED

Steady left-turn YELLOW ARROW	Steady right-turn YELLOW ARROW
Dual-arrow left-turn signal section	Dual-arrow right-turn signal section

1. During either protected movement, the signal face shall display a steady GREEN ARROW signal indication for the appropriate direction.
2. During either permissive movement, the signal face shall display a flashing YELLOW ARROW signal indication for the appropriate direction.

B. Permissive Only Mode — When the permissive only mode is used for either a left turn or a right turn or both on an approach, the signal indications shall be provided as required by Paragraph A of this Standard, with the following applicable exceptions:

1. **Right Turn — The dual-arrow right-turn signal section shall display only a flashing right-turn YELLOW ARROW indication or shall be replaced by a signal section that displays only a flashing right-turn YELLOW ARROW indication.**
2. **Left Turn — The dual-arrow left-turn signal section shall display only a flashing left-turn YELLOW ARROW indication or shall be replaced by a signal section that displays only a flashing left-turn YELLOW ARROW indication.**

C. Protected Only Mode — When the protected only mode is used for either a left turn or a right turn or both on an approach, the signal indications shall be provided as required by Paragraph A of this Standard with the following applicable exceptions:

1. **Right Turn — The dual-arrow right-turn signal section shall display only a steady right-turn GREEN ARROW indication or shall be replaced by a signal section that displays only a steady right-turn GREEN ARROW indication.**
2. **Left Turn — The dual-arrow left-turn signal section shall display only a steady left-turn GREEN ARROW indication or shall be replaced by a signal section that displays only a steady left-turn GREEN ARROW indication.**