

## ATTACHMENT NO. 5

### National Committee on Uniform Traffic Control Devices

#### Signals Technical Committee Recommendations

Approved by the NCUTCD Council January 2008 & June 2008

The page numbers and lines listed refer to the npa\_textshowingrev.pdf NPA document unless otherwise noted.

The following code has been used:

Black text (with no color, underline, strikethrough, or highlight) – Text currently in the MUTCD and NPA

Underline (Blue underlined text) – Additions shown in NPA supported by NCUTCD Council

~~Strike out~~ (Red text with strikethrough) – Deletions shown in NPA supported by NCUTCD Council

~~Strike out~~ (Red text with strikethrough and yellow highlighting) – Deletions shown in NPA that remain recommended for deletion in conjunction with the deletion of surrounding text.

Underline (Black underlined text with yellow highlight) – Additions to NPA approved by NCUTCD Council

~~Strike out~~ (Black text with strikethrough and yellow highlight) - Deletions to existing MUTCD text approved by NCUTCD Council.

Underline (Blue underlined text with strikethrough and yellow highlight) – Additions shown in NPA but approved for deletion by the NCUTCD Council

Highlight (Black text with gray highlight) – description of recommended actions

A brief summary of the major issues in each Chapter is listed under the Chapter title. Specific recommendations have reference numbers listed and list the applicable page and line numbers from the npa\_textshowingrev.pdf document

## CHAPTER 4A. GENERAL

The major issue addressed within this Chapter is the relocation of all definitions throughout the MUTCD into Part 1. The NCUTCD supports the relocation.

### Section 4A.01 Types

4.1 4A.01 Pg 837 Ln 3-8

“Traffic control signals for toll plazas” is deleted from the support paragraph due to the recommended changes to Chapter 4K.

Support:

The following types and uses of highway traffic signals are discussed in Part 4: traffic control signals; pedestrian signals; emergency-vehicle ~~traffic control~~ signals; traffic control signals for one-lane, two-way facilities; traffic control signals for freeway entrance ramps; traffic control signals for movable bridges; ~~traffic control signals for toll plazas~~; ~~flashing beacons~~; lane-use control signals; ~~flashing beacons~~; and in-roadway lights.

### Section 4A.02 Definitions Relating to Highway Traffic Signals

4.2 4A.02 Pg 837 after Ln 9

It is recommended that a reference be added in Part 4 and in other parts of the MUTCD noting that definitions are in Part 1. (See comment 4.6 regarding the location of definitions) The reference should be developed by FHWA and be consistent through the MUTCD parts.

4.3 4A.02 Pg 838 Ln 11-13

It is recommended that “hybrid signal” be changed to “hybrid beacon” in definition 23 and in all other places where it occurs throughout the MUTCD. The operation of these devices includes displays common to both signals and beacons. This recommended change is based on: 1. their operation as dark between actuations makes them more like a beacon than a signal, and 2. characterization as a signal could create potential confusion in states that require approaching vehicles to stop at a dark traffic control signal. These were specifically intended to not be considered traffic control signals and the arrangement of the signal face with two red sections over a single yellow section was intended to strengthen this intention. Calling it a “hybrid signal” introduces potential confusion. Therefore, the term “hybrid beacon” is preferred by the NCUTCD.

4.4 4A.02 Pg 839 Ln 10-12

It is recommended that “pedestrian hybrid signal” be changed to “pedestrian hybrid beacon” in definition 40 and all other places where it occurs throughout the MUTCD. The operation of these devices includes displays common to both signals and beacons. This recommended change is based on: 1. their operation as dark between actuations makes them more like a beacon than a signal, and 2. characterization as a signal could create potential confusion in states that require approaching vehicles to stop at a dark traffic control signal. These were specifically intended to not be considered traffic control signals and the arrangement of the signal face with two red sections over a single yellow section was intended to strengthen this intention. Calling it a “pedestrian hybrid signal” introduces potential confusion. Therefore, the term “pedestrian hybrid beacon” is preferred by the NCUTCD.

4.5 4A.02 Pg 839 following Line 33

It is recommended that a new definition of “pushbutton information message” be added as this term is used in several places in Chapter 4E.

**xx. Pushbutton Information Message—a recorded message that can be actuated by pressing a pushbutton when the walk interval is not timing. The recorded message provides the name of the street that the crosswalk associated with that particular pushbutton crosses, and can also provide other information about the intersection signalization or geometry.**

4.6 4A.02 Pg 837 Ln 10 through Pg 840 Ln 42

It is recommended that the Standard paragraph of 4A.02 be deleted and all definitions in individual parts of the MUTCD be relocated to Part 1. Currently some definitions are listed both in Part 1 and in other parts of the MUTCD. Other definitions do not appear in Part 1 but appear in specific parts. Having all definitions in a common location will simplify finding needed definitions.

(Since there is a large amount of text proposed for deletion from Part 4 and relocation to Part 1 and it continuous between the referenced lines, the text recommended for relocation it is not included in this document.)

## **CHAPTER 4B. TRAFFIC 1 CONTROL SIGNALS—GENERAL**

4.7 4B Pg 841 Ln 1 through Pg 843 Ln17

The NCUTCD concurs with Chapter 4B as proposed in the NPA.

## CHAPTER 4C. TRAFFIC CONTROL SIGNAL NEEDS STUDIES

Two major issues are addressed within this Chapter. One is the revision to the pedestrian volume warrant. The other is the addition of a new warrant for an intersection near a highway-rail grade crossing. The NCUTCD supports the NPA language on both of these items.

### Section 4C.06 Warrant 5, School Crossing

4.8 4C.06 Pg 849 Ln 1-4

It is recommended that the Support be modified to specify that “schoolchildren” is intended to include high school students. As written in the NPA (elementary to high school students), it could be interpreted to either include or exclude high school students. It was felt that high school students should be included in the meaning of this term.

Support:

The School Crossing signal warrant is intended for application where the fact that schoolchildren cross the major street is the principal reason to consider installing a traffic control signal. [For the purposes of this warrant, the word “schoolchildren” is defined as to include elementary to through high school students.](#)

4.9 4C.06 Pg 849 Ln 5-11

It is recommended that the Standard be modified to use the term “schoolchildren” throughout rather than “children”: and “students” as listed in the NPA since schoolchildren is the defined term.

Standard:

The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of schoolchildren at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the schoolchildren are using the crossing is less than the number of minutes in the same period (see Section 7A.03) and there are a minimum of 20 students schoolchildren during the highest crossing hour.

## CHAPTER 4D. TRAFFIC CONTROL SIGNAL FEATURES

Several major issues are addressed within this Chapter. These include the size of signal faces for new installations, the number of signal faces for various approach conditions, and left-turn and right-turn signal faces. The use of flashing yellow arrows and flashing red arrows for permissive turns is also introduced. This is the result of years of study on displays for permissive left turn indications. This Chapter has also undergone a major reorganization in the NPA.

The NCUTCD supports the NPA proposal to reorganize the Chapter and to require 12" signal faces for most new installations, but recommends that some additional options to use 8" signal faces be added. Modifications to the number of signal faces for various approaches are recommended and the information is shown in a table rather than in text as listed in the NPA. The NCUTCD supports the addition of flashing yellow arrows and flashing red arrows for permissive turns. Additionally, the NCUTCD has, based on the extensive research that was conducted concerning displays for permissive left turns, recommended prohibiting the use of circular green indications for permissive turns in separate signal faces.

#### **Section 4D.04 Signal Indications – Design, Illumination, Color, and Shape**

4.10 4D.04 Pg 853 Ln 51

It is recommended that the strobe prohibition be expanded to colors other than red. A demonstration at a prior STC meeting of a blue flashing ring around the perimeter of a yellow circular beacon was noted as a possible need for expanding the prohibition. The use of a flashing yellow arrow in a signal face for a permissive left-turn movements was not considered to conflict with this prohibition since the FYA is a signal indication, not a strobe or other flashing display. However, FHWA review and wordsmithing as needed is recommended to address potential conflicts with flashing signal sections.

Strobes or other flashing displays within or adjacent to ~~red~~ any steady-signal indications shall not be used.

#### **Section 4D.05 Size of Vehicular Signal Indications**

4.11 4D.05 Pg 854 Ln 39-41

It is recommend to require 12" indications for most new signal faces as proposed in the NPA, but to add two additional conditions under which 8" indications would be permitted (see comment 4.12). Also, it is recommended to move the statement permitting existing 8" indications to be retained for the remainder of their useful life from Standard to Option to improve readability. (see comment 4.13).

Except as noted in the Option paragraph below, 300 mm (12 in) signal lenses indications shall be used for all signal sections in all new signal faces. except that existing 200 mm (8 in) signal indications shall be permitted to be retained for the remainder of their useful service life.:

4.12 4D.05 Pg 855 after Ln 12

It is recommend to add the following two conditions under which 8” indications would be permitted. It is felt that low speed (30 MPH or less) roadways with only 1 or 2 approach lanes can be adequately served by 8” lenses for distances up to 120 feet. Since supplemental indications are not required, the use of 8” lenses should be permitted for these indications. The addition of these options would not preclude the use of 12” lenses under these conditions.

D. For circular indications located less than 35 m (120 feet) from the stop line on roadways with one or two approach lanes and with posted or statutory speed limits of 30 mph or less.

E. For supplemental nearside signal indications.

4.13 4D.05 Pg 855 after Ln 12 and following the preceding additions

It is recommended to move the statement permitting existing 8” indications to be retained for the remainder of their useful life from Standard to Option to improve readability.

Existing 200 mm (8 in) signal indications may be retained for the remainder of their useful service life.

## **Section 4D.07 Positions of Signal Indications Within a Vertical Signal Face**

4.14 4D.07 Pg. 856 Ln 9-11

It is recommend to delete “immediately” to address signal faces using a flashing yellow arrow (FYA) for permissive left-turn indications. In those signal faces, the steady left yellow arrow is immediately above the flashing left yellow arrow rather than the steady green arrow indication.

**In vertically-arranged signal faces, each signal section that displays a YELLOW ARROW signal ~~lens~~ indication shall be located ~~immediately~~ above the signal section that displays the GREEN ARROW signal ~~lens~~ indication to which it applies.**

4.15. 4D.07 Pg. 856 Ln 42-44

It is recommend to delete “immediately” to address signal faces using a FYA for permissive left-turn indications. In those signal faces, the steady left yellow arrow is immediately to the left of the flashing left yellow arrow rather than the steady green arrow indication.

**In horizontally-arranged signal faces, ~~the~~ each signal section that displays a YELLOW ARROW signal ~~lens~~ indication shall be located ~~immediately~~ to the left of the signal section that displays the GREEN ARROW signal ~~lens~~ indication to which it applies.**

#### **Section 4D.11 Number of Signal Faces on an Approach**

It is recommended that a new table be used to illustrate the recommended number of signal heads for various lane and speed combinations. While most of the number of signal heads for the various combinations are guidance, the table notes that a minimum of 2 faces are required for the approach through lanes in all cases. The addition of the proposed new table will permit deletion of various text as the information will be conveyed through the table. Following are changes to section 4D.11 related to the addition of the new table.

4.16 4D.11 Pg. 864 Ln 6-12

Delete these lines as this information is covered by the proposed new table.

It is noted that the recommended threshold speeds listed in the proposed table have been changed from the NPA values. The NPA listed “posted or statutory or 85<sup>th</sup> percentile speed” that “exceeds 40 MPH”. The posted and statutory speeds are typically known and change only upon action by a governing body. However, the 85<sup>th</sup> percentile speed is often unknown and varies depending on when and where the data was collected. A posted or statutory speed that exceeds 40 MPH would be equal to or greater than 45 MPH using 5 MPH increments. However, an 85<sup>th</sup> percentile speed greater than 40 MPH could be 41 MPH or higher. 85<sup>th</sup> percentile speeds between 40 and 45 MPH would create a situation where neither the posted not the statutory speed met the listed threshold condition, but the 85<sup>th</sup> percentile speed did. Since these are listed as “or” conditions, there is a question of whether the practitioner has the choice of using any of the three listed speeds or if they must use the highest of the three.

By changing the threshold values to a posted, statutory, or 85<sup>th</sup> percentile speed of 45 MPH or higher, a condition should not exist where the 85<sup>th</sup> percentile speed exceeds the threshold but the posted and/or statutory speeds do not. It is possible that the 85<sup>th</sup> percentile speed could be less than the threshold while the posted and/or statutory speed meet or exceed the threshold. However, this does not

present the same possible dilemma to the practitioner as the opposite situation does. The threshold conditions listed in the proposed new table use this “equal to or greater” basis.

If the posted or statutory speed limit or the 85<sup>th</sup> percentile speed on an approach to a signalized location exceeds 60 is km/h or exceeds 40 mph , signal faces should be provided (see Figure 4D-3) as follows:

A. All primary (non-supplemental) signal faces for through traffic and any primary signal faces for exclusive turn lanes that are required by Sections 4D.17 through 4D.24 should be located overhead on the far side of the intersection.

B. If there are two or more lanes for through traffic, a separate signal face should be provided for each through lane and they should be located approximately over the center of each through lane.

If the proposed new table is not used and the NPA text is retained, it is recommended that Lines 6 & 7 on Page 864 be modified s follows to address the potential speed limit versus 85<sup>th</sup> percentile issue described above:

If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on an approach to a signalized location ~~exceeds 60~~ is 70 km/h (45 mph) or ~~exceeds 40 mph~~ higher, signal faces should be provided (see Figure 4D-3) as follows:

4.17 Pg 864 Ln 13-19

Renumber these items due to prior deletion of A & B from lines 6-12. Delete “on or near the near-right, far-right, near-left, and/or far-left corners of the intersection” from renumbered item B.

EA. Except for shared left-turn and right-turn signal faces, any primary signal face required by Sections 4D.17 through 4D.24 for an exclusive turn lane should be located approximately over the center of each exclusive lane.

EB. One or more supplemental pole-mounted or overhead signal faces ~~on or near the near-right, far-right, near-left, and/or far-left corners of the intersection~~ should be strongly considered to provide added visibility for approaching traffic that is traveling behind large vehicles.

EC. All signal faces on the approach should have backplates.

4.18 Pg 864 Ln 20-21

Delete as the proposed new table addresses situations of urban or suburban arterials streets with four or more lanes.

This layout of signal faces should also be considered for any major urban or suburban arterial street with four or more lanes.



4.19 Pg 864 after Ln 21

Add guidance statement to refer to the proposed new table.

The number of signal faces to be provided should be based upon the number of through approach lanes, roadway width, roadway speed, and other factors based on engineering judgment and as indicated in Table 4D-X.

4.20 Pg 864 after Ln 21 (following prior new guidance statement)

Add support statement to provide good practice information in the event the 85<sup>th</sup> percentile speed information is not available.

Support:

If the 85<sup>th</sup> percentile speed is not available, consider using the posted speed plus 5 or more miles per hour.

4.21 Pg 864 at the end of Section 4D.11

The following new table is proposed to illustrate the recommended number of signal heads for various lane and speed combinations. While most of these are guidance, the table notes that a minimum of 2 faces are required for the approach through lanes in all cases.

It is recommended that the wording by the \*\* statement associated with the new table be reviewed and edited by FHWA as needed for consistency with similar statements in other sections of the MUTCD.

**Table 4D-X (New table)**

**Recommended Minimum Number of Through Signal Faces\*\***

Speed**	Number of Approach Through Lanes							
	1		2		3		4 or More	
	Total	Overhead	Total	Overhead	Total	Overhead	Total	Overhead
< 35 mph	2*	0	2*	0	2*	1	3*	2
35 to < 45 mph	2*	0	2*	1	2*	1	4*	2
45 mph & above	2*	1	2*	1	3*	2	4*	2

\*A minimum of 2 signal faces is required (See Section 4D.xx).

\*\*The higher of the posted, statutory, or 85<sup>th</sup> percentile speed (if available) should be used.

\*\*\*The values represent the number of total and overhead signal faces, respectively, based on the number of through approach lanes. Also, see cone of vision requirements otherwise indicated in this manual. These recommended number of through signal faces may be exceeded.

## **Section 4D.17 Signal Indications for Left-Turn Movements – General**

4.22 Pg 868 Ln 8 - 40

Several changes are recommended relating to displays for left-turn movements – particularly the display of a circular green indication for a permissive left-turn in a separate left-turn signal face. The NPA includes guidance language recommending against the use of a circular green indication for permissive left-turn movements under certain circumstances. The NCUTCD recommends that the MUTCD prohibit the display of a circular green for a permissive left-turn movement in a separate left-turn signal face over or in front of a left-turn lane. These changes are shown in the following sections. These recommended changes are not intended to change the NPA language relating to the display of such indications in shared signal faces.

Signal faces and indications for permissive left turns were the subject of much research over the past ten or more years. The results of that research indicated that a circular green for a permissive left-turn movement located over or in front of a left-turn lane was often misunderstood by drivers. Also, a flashing yellow arrow to indicate a permissive left-turn movement proved very successful. These proposed changes support the use of flashing yellow arrows for permissive left turns.

The recommended changes to address the circular green permissive left-turn in a separate signal face also eliminate the need to address flashing yellow arrow signal face and flashing red arrow signal face in C and D below. Therefore, these have been marked for deletion.

In addition to addressing the circular green/permissive left-turn issue noted above, some changes are recommended to 4D.17 concerning the use of the term “adjacent through movement”. It was noted that the adjacent movement may be a right turn rather than through movement in some cases.

Support:

Sections 4D.17 through 4D.20 describe the use of the following four types of signal faces for controlling left-turn movements:

- A. Shared signal face – This type of signal face controls both the left-turn movement and the adjacent through movement and can serve as one of the two required signal faces for the through adjacent movement. A shared signal face always displays the same color of circular indication that the adjacent through that is displayed for the adjacent movement signal face or faces display. If a shared signal face that provides protected/permissive mode left turns is mounted overhead at the intersection, it is usually positioned over or slightly to the right of the extension of the lane line separating the left-turn lane from the adjacent through lane, or over the extension of this lane line.
- B. Separate left-turn signal face – This type of signal face controls only the left-turn movement and cannot serve as one of the two required signal faces for the adjacent through movement because it sometimes displays a different color of circular signal indications applicable only to the left-turn movement, than the adjacent through signal faces display or it is comprised only of steady left-turn arrow indications. If a separate left-turn signal face is mounted overhead at the intersection, it is usually positioned over the extension of the left-turn lane, or over the extension of this lane. Separate left-turn signal faces are used to control protected-only mode left turns, permissive-only mode left turns and protected/permissive mode left turns. In a separate left-turn signal face, a flashing left-turn YELLOW ARROW signal indication or a flashing left-turn RED ARROW signal indication is used to control permissive left-turning movements.
- C. Flashing yellow arrow-signal face – This type of signal face controls only the left-turn movement and cannot serve as one of the two required signal faces for the adjacent through movement because it consists entirely of left turn arrows and cannot display any circular signal indications. If a flashing yellow arrow-signal face is mounted overhead at the intersection, it is usually positioned over the left-turn lane, or over the extension of this lane. A flashing yellow arrow-signal face displays a flashing left-turn YELLOW ARROW signal indication (instead of a steady CIRCULAR GREEN signal indication) during steady mode (stop-and-go) operation to control permissive left-turning movements from an intersection approach.
- D. Flashing red arrow-signal face – This type of signal face is used only for unusual geometric conditions, such as wide medians with offset left turn lanes, and only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn. This type of signal face controls only the left-turn movement and cannot serve as one of the two required signal faces for the adjacent through movement because it consists entirely of left turn arrows and cannot display any circular signal indications. If a flashing red arrow-signal face is mounted overhead at the intersection, it is usually positioned over the left-turn lane, or over the extension of this lane. A flashing red arrow-signal face displays a flashing left-turn RED ARROW signal indication (instead of a steady CIRCULAR GREEN signal indication) during steady mode

(stop-and-go) operation to control permissive left turning movements from an intersection approach.

## Section 4D.18 Signal Indications for Permissive Only Mode Left-Turn Movements

4.23 4D.18 Pg 870 Ln 33 through Pg 871 Ln 7

The prohibition of circular green indications for permissive left-turn movements in separate left-turn signal faces eliminates the need for A through F of the Standard and the Guidance shown below.

If a separate left-turn signal face is **provided for being operated in a permissive only left-turn mode, and a CIRCULAR GREEN signal indication shall not be used.** ~~is provided,~~ it shall meet the following requirements:

- ~~A. It shall be capable of displaying, from top to bottom or from left to right, the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, and CIRCULAR GREEN. Only one of the three indications shall be displayed at any given time.~~
- ~~B. During the permissive left turn movement, the left-turn signal face shall display a CIRCULAR GREEN signal indication shall be displayed.~~
- ~~C. If the CIRCULAR GREEN and CIRCULAR YELLOW signal indications in the separate left-turn signal face are visibility limited from the adjacent through movement, the separate left-turn signal face shall not be required to simultaneously display the same color of circular signal indication as the signal faces for the adjacent through movement.~~
- ~~D. If the CIRCULAR GREEN and CIRCULAR YELLOW signal indications in the separate left-turn signal face are visibility limited from the adjacent through movement, the display of a CIRCULAR GREEN signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady added to increase accuracy CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement shall be permitted.~~
- ~~E. If the separate left-turn signal face does not simultaneously display the same color of circular signal indication as the signal faces for the adjacent through movement, a LEFT TURN YIELD ON GREEN (symbolic circular green ball) (R10-12) sign or a LEFT TURN SIGNAL—YIELD ON GREEN (symbolic circular green ball) (R10-21) sign (see Figure 2B-30) shall be used.~~
- ~~F. If the permissive only mode is not the only left-turn mode used for the approach, the signal face shall be the same separate left-turn signal face that is used for the protected/permissive mode (see Section 4D.20) except that the left-turn GREEN ARROW and left-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode.~~

Guidance:

~~Because signal faces containing a CIRCULAR GREEN signal indication should not be post mounted on the far side median or overhead above the left turn lane(s) or the extension of the lane(s) (see Section 4D-13), a separate left turn signal face should not be used for permissive only mode left turns for new or reconstructed signal installations.~~

4.24 4D.18 Pg 871 Ln 8-10

Comment 4.22 noted that proposed rewording of that section eliminated the need for the term flashing yellow arrow signal face and recommended its deletion.

**Standard:**

~~If a separate left-turn signal face is being operated in a flashing yellow arrow signal face is provided for permissive only mode left-turn mode, and a flashing left-turn YELLOW ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-7):~~

4.25 4D.18 Pg 871 Ln 34-40

Comment 4.22 noted that proposed rewording of that section eliminated the need for the term flashing yellow red signal face and recommended its deletion.

**Option:**

~~For unusual geometric conditions, such as wide medians with offset left-turn lanes, and only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn, a separate left-turn signal face with a flashing left-turn RED ARROW signal indication flashing red arrow signal face that flashes a left-turn RED-ARROW signal indication during the permissive left-turn movement may be used.~~

**Standard:**

~~If a separate left-turn signal face is being operated in a flashing red arrow signal face is provided for permissive only mode left turns, mode and a flashing left-turn RED ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-8):~~

## Section 4D.19 Signal Indications for Protected Only Mode Left-Turn Movements

4.26 4D.19 Pg 872 Ln 44-45

Comment 4.22 noted that the proposed rewording eliminated the need for the term flashing yellow arrow signal face and recommended its deletion. This modifies the standard to eliminate the term from this paragraph.

**Standard:**

~~If a flashing yellow arrow signal face is being operated in a protected only left-turn mode.~~ **When it is operated in a protected only left-turn mode, it shall meet the following requirements:**

4.27 4D.19 Pg 873 after Ln 2.

Add an option to note that a separate left-turn signal face with a flashing left-turn yellow arrow may be operated in a variable left-turn mode.

**Option:**

**A separate left-turn signal face which has a flashing left-turn YELLOW ARROW signal indication may be operated in a variable left-turn mode.**

4.28 4D.19 Pg 873 Ln 3-4

Comments 4.22 noted that the proposed rewording eliminated the need for the term flashing red arrow signal face and recommended its deletion. This modifies the standard to eliminate the term from this paragraph.

**Standard:**

~~If a flashing red arrow signal face is being operated in a protected only left-turn mode.~~ **When it is operated in a protected only left-turn mode, it shall meet the following requirements:**

4.29 4D.19 Pg 873 after Ln 17

Add an option to note that a separate left-turn signal face with a flashing left-turn red arrow may be operated in a variable left-turn mode.

**Option:**

**A separate left-turn signal face which has a flashing left-turn RED ARROW signal indication may be operated in a variable left-turn mode.**

## **Section 4D.20 Signal Indications for Protected/Permissive Mode Left-Turn Movements**

4.30 4D.20 Pg 874 Ln 1-36

The prohibition of circular green indications for permissive left-turn movements in separate left-turn signal faces eliminates the need for A through F of the Standard and the Guidance shown below.

~~2.~~ **If a separate left-turn signal face is provided being operated in a protected/permissive left-turn mode, a CIRCULAR GREEN signal indication shall not be used. it shall be considered a left-turn signal face, and shall meet the following requirements:**

- ~~A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR green, steady left turn YELLOW ARROW, and left turn GREEN ARROW. Only one of the three circular indications shall be displayed at any given time.~~
- ~~B. During the protected left turn movement, the separate left turn signal face shall display a left turn GREEN ARROW signal indication. **During the protected left turn movement, the signal faces for through traffic on the opposing approach shall simultaneously display CIRCULAR RED signal indications.**~~
- ~~C. A steady left turn YELLOW ARROW signal indication shall be displayed following the left turn GREEN ARROW signal indication, unless the left turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are being terminated together, in which case a steady CIRCULAR YELLOW signal indication shall be displayed following the left turn GREEN ARROW signal indication.~~
- ~~D. During the permissive left turn movement, the separate left turn signal face shall display only a CIRCULAR GREEN signal indication.~~
- ~~E. If the CIRCULAR GREEN and CIRCULAR YELLOW signal indications in the separate left turn signal face are visibility limited from the adjacent through movement, the separate left turn signal face shall not be required to simultaneously display the same color of circular signal indication as the signal faces for the adjacent through movement.~~
- ~~F. If the CIRCULAR GREEN and CIRCULAR YELLOW signal indications in the separate left turn signal face are visibility limited from the adjacent through movement, the display of a CIRCULAR GREEN signal indication for a permissive left turn movement while the signal faces for the adjacent through movement display steady ~~added to increase accuracy~~ CIRCULAR RED signal indications and the opposing left turn signal face displays a left turn GREEN ARROW for a protected left turn movement shall be permitted.~~
- ~~G. If the separate left turn signal face does not simultaneously display the same color of circular signal indication as the signal faces for the adjacent through movement, a LEFT TURN SIGNAL—YIELD ON GREEN (symbolic circular green ball) (R10-21) sign (see Figure 2B-30) shall be used.~~

Guidance:

~~Because signal faces containing a CIRCULAR GREEN signal indication should not be post-mounted on the far side median or overhead above the left turn lane(s) or the extension of the lane(s) (see Section 4D.13), a separate left turn signal face should not be used for protected/permissive mode left turns for new or reconstructed signal installations.~~

Comment 4.4.21 noted that the proposed rewording eliminated the need for the term flashing yellow arrow signal face and recommended its deletion. This modifies the standard to eliminate the term from this paragraph.

Standard:

If a separate left-turn signal face is being operated in a flashing yellow arrow signal face is provided for protected/permissive mode left turns mode and a flashing left-turn YELLOW ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-12):

4.32 4D.20 Pg 875 Ln 20-27

Comment 4.22 noted that the proposed rewording eliminated the need for the term flashing red arrow signal face and recommended its deletion. This modifies the option and standard to eliminate the term from these paragraphs.

Option:

For unusual geometric conditions, such as wide medians with offset left-turn lanes, and only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn, a separate left-turn signal face with a flashing left-turn RED ARROW signal indication flashing red arrow signal face that flashes a left-turn RED ARROW signal indication during the permissive left-turn movement may be used.

Standard:

If a separate left-turn signal face is being operated in a flashing red arrow signal face is provided for protected/permissive mode left- turns mode and a flashing left-turn RED ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-8):

## **Section 4D.21 Signal Indications for Right-Turn Movements - General**

4.33 4D.21 Pg 876 Ln 1-29

Several changes are recommended relating to displays for right-turn movements – particularly the display of a circular green indication for a permissive right turn in a separate right-turn signal face. To parallel the recommendation for separate left-turn signal faces, it is recommended that MUTCD prohibit the display of a circular green for a permissive right-turn movement in a separate right-turn signal face over or in front of a right-turn lane. These changes are shown in the following sections. These recommended changes are not intended to change the NPA language relating to the display of such indications in shared signal faces.



The recommended changes to address the circular green permissive right turn in a separate signal face are thought to eliminate the need to address flashing yellow arrow signal face and flashing red arrow signal face in C and D below. Therefore, these have been marked for deletion as noted below also.

In addition to addressing the circular green/permissive right turn issue noted above, some changes are recommended to 4D.21 concerning the use of the term “adjacent through movement”. It was noted that the adjacent movement may be a left turn rather than through movement in some cases.

Support:

Sections 4D.21 through 4D.24 describe the use of the following four types of signal faces for controlling right-turn movements:

- A. Shared signal face – This type of signal face controls both the right-turn movement and the adjacent through movement and can serve as one of the two required signal faces for the through adjacent movement. A shared signal face always displays the same color of circular indication that the adjacent through signal face or faces display.
- B. Separate right-turn signal face – This type of signal face controls only the right-turn movement and cannot serve as one of the two required signal faces for the adjacent through movement because it sometimes displays signal indications applicable only to the right-turn movement, a different color of circular signal indication than the adjacent through signal faces display. If a separate right-turn signal face is mounted overhead at the intersection, it is usually positioned over the right-turn lane, or over the extension of this lane. Separate right-turn signal faces are used to control protected mode right turns or protected/permissive mode right turns. In a separate right-turn signal face a flashing right-turn YELLOW ARROW signal indication or a flashing right-turn RED ARROW signal indication is used to control permissive right-turning movements.
- C. Flashing yellow arrow signal face—This type of signal face controls only the right turn movement and cannot serve as one of the two required signal faces for the adjacent through movement because it consists entirely of right turn arrows and cannot display any circular signal indications. If a flashing yellow arrow signal face is mounted overhead at the intersection, it is usually positioned over the right turn lane, or over the extension of this lane. A flashing yellow arrow signal face displays 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.
- D. Flashing red arrow signal face—This type of signal face is used only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive right turn. This type of signal face controls only the right turn movement and cannot serve as one of the two required

signal faces for the adjacent through movement. If a flashing red arrow signal face is mounted overhead at the intersection, it is usually positioned over the right turn lane, or over the extension of this lane. A flashing red arrow signal face displays a flashing right-turn RED 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.

## Section 4D.22 Signal Indications for Permissive Only Mode Right-Turn Movements

4.34 4D.22 Pg 878. Ln 15-17

Modify standard to prohibit the use of a circular green in a separate right-turn signal face operating in a permissive only mode and eliminate the flashing yellow arrow signal face term.

**If a separate right-turn signal face is being operated in a shall not be used for permissive only mode right-turns mode, a CIRCULAR GREEN signal indication shall not be used.**

**If a separate right-turn signal face is being operated in a flashing yellow arrow signal face is provided for permissive only mode right-turns mode and a flashing right-turn YELLOW ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-14):**

4.35 4D.22 Pg 878 Ln 52 through Pg 879-Ln 3

Modify to eliminate the flashing red arrow signal face term.

Option:

When an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive right turn, a separate right-turn signal face with a flashing right-turn RED ARROW signal indication flashing red arrow signal face that flashes a right-turn RED ARROW signal indication during the permissive right turn movement may be used.

Standard:

**If a separate right-turn signal face is being operated in flashing red arrow signal face is provided for permissive only mode right-turns mode and a flashing right-turn RED ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-15):**

## Section 4D.23 Signal Indications for Protected Only Mode Right-Turn Movements

4.36 4D.23 Pg 880 Ln 32-33

Comment 4.22 noted that the proposed rewording eliminated the need for the term flashing yellow arrow signal face and recommended its deletion. This modifies the standard to eliminate the term from this paragraph.

**Standard:**

~~If a flashing yellow arrow signal face is being operated in a protected only right-turn mode~~ **When it is operated in a protected only right-turn mode, it shall meet the following requirements:**

4.37 4D.23 Pg 881 after Ln 2.

Add an option to note that a separate left-turn signal face with a flashing right-turn yellow arrow may be operated in a variable left-turn mode.

**Option:**

**A separate right-turn signal face which has a flashing right-turn YELLOW ARROW signal indication may be operated in a variable right-turn mode.**

4.38 4D.23 Pg 881 Ln 3-5

Comment 4.22 noted that the proposed rewording eliminated the need for the term flashing red arrow signal face and recommended its deletion. This modifies the standard to eliminate the term from this paragraph.

**Standard:**

~~If a flashing red arrow signal face is being operated in a protected only right-turn mode~~ **When it is operated in a protected only right-turn mode, it shall operate under the same set of requirements as the separate right-turn signal face that is described earlier in this Section.**

4.39 4D.23 Pg 881 after Ln 5.

Add an option to note that a separate right-turn signal face with a flashing right-turn red arrow may be operated in a variable left-turn mode.

**Option:**

**A separate right-turn signal face which has a flashing right-turn RED ARROW signal indication may be operated in a variable right-turn mode.**

## **Section 4D.24 Signal Indications for Protected/Permissive Mode Right-Turn Movements**

4.40 4D.24 Pg 881. Ln 33-35

Modify standard to prohibit the use of a circular green in a separate right-turn signal face operating in a protected/permissive mode and eliminate the flashing yellow arrow signal face term.

**~~A If a separate right-turn signal face shall not be used for~~ is being operated in a protected/permissive mode right-turns mode, a CIRCULAR GREEN signal indication shall not be used.**

**If a separate right-turn signal face is being operated in a flashing yellow arrow signal face is provided for protected/permissive mode right-turns mode and a flashing right-turn YELLOW ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-19):**

4.41 4D.24 Pg 882 Ln 31-37

Modify to eliminate the flashing red arrow signal face term.

Option:

When an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive right turn, **separate right-turn signal face with a flashing right-turn RED ARROW signal indication** ~~a flashing red arrow signal face~~ that flashes ~~a right turn RED ARROW signal indication~~ during the permissive right-turn movement may be used.

Standard:

**If a separate right-turn signal face is being operated in a flashing red arrow signal face is provided for protected/permissive mode right-turns mode and a flashing right-turn RED ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-15):**

## CHAPTER 4E. PEDESTRIAN CONTROL FEATURES

There are two major issues addressed within this Chapter. One concerns pedestrian interval sequence and timing – especially the termination of the flashing DON'T WALK (FDW) interval. The other is the expansion of the countdown pedestrian display and allowing pedestrian crossings to begin during the countdown as long as the crossings is completed by the time the zero is displayed.

The NCUTCD is recommending significant changes to the pedestrian intervals. It is recommended that there should always be a minimum interval of at least 3 seconds between the end of the flashing DON'T WALK (FDW) display and the

release of any vehicular traffic that might be in conflict with the terminating FDW interval. This interval has been called the Pedestrian Buffer interval. A minimum rather than fixed interval is specified because vehicle actuated sequences and certain combinations of vehicle and pedestrian displays can result in Pedestrian Buffer interval lengths that are determined by factors other than pedestrian considerations. It is not intended that the Pedestrian Buffer interval be shortened even in cases of preemption or priority operation. Since there is no particular harm related to an extended Pedestrian Buffer interval, no maximum value for the Pedestrian Buffer interval is specified.

This Pedestrian Buffer interval is considered critical as it provides a margin of error that allows a pedestrian who miscalculates the time needed to cross a roadway, with or without a countdown display, to better avoid a conflict with a vehicle. It is recognized that some regular users of crosswalks may deliberately include this buffer time in their crossing time calculation. A deterrent to that is ending the FDW display and the countdown zero concurrently. The proposed revision of the Motor Vehicle Code to recognize the countdown display requires that any crossing begun during the countdown display must be concluded by the time that the zero is displayed. Otherwise, a Code violation occurs. The meaning of the WALK display remains unchanged so that those who begin crossing during the WALK interval but cannot physically proceed quickly to complete their crossing before the end of the FDW or countdown display are afforded all of the current protections and freedom from enforcement.

The STC anticipates that future versions of controller software will incorporate a timed Pedestrian Buffer interval between the end of the FDW/countdown zero interval and the release of conflicting vehicular traffic. It is expected that the Pedestrian Buffer interval timing value will be a part of the pedestrian interval series of controller data inputs and that the controller logic be designed to implement the intention of the interval without any other data input. It is also required that the countdown interval length be the same as the FDW and it is desirable that it be generated within the signal controller and distributed to the countdown display as needed. This signal controller generation of the countdown display allows future emergency FDW interval termination in a manner that notifies the pedestrian when the FDW interval is being foreshortened due to RR or other preemption.

## **Section 4E.01 Pedestrian Signal Heads**

Although in-roadway warning lights at crosswalks is the only application currently included in Chapter 4N, the chapter title is In-Roadway Lights. When this chapter was added, it was done in a manner to permit additional applications to be added later. Therefore, it is recommended to just list the chapter title in the following paragraph and not limit it to a particular application included in the chapter.

Support:

[Chapter 4F contains information regarding the use of pedestrian hybrid signals and Chapter 4N contains information regarding the use of In-Roadway Warning Lights at unsignalized marked crosswalks.](#)

## **Section 4E.02.Meaning of Pedestrian Signal Head Indications**

4.43 4E.02 Pg 893 Ln 22-30

“Traffic control device” is a better term than “signs or signals” in paragraph. While signs or signals may be the only envisioned devices that would apply here, there is no benefit to limiting this to them. They are still included in traffic control device.

The addition of “or shoulder” and “of sufficient width for pedestrians to wait” is recommended for consistency with other sections of the MUTCD (see sections 4E.08, 4E.09, & 4E.10).

The NCUTCD previously recommended a change to the MUTCD which would permit pedestrians, where countdown pedestrian displays are present, to begin their crossing during a countdown period even though the pedestrian head is displaying a flashing don’t walk. That recommendation required that the pedestrian be to the far side of the travelled way by the time the zero is shown in the countdown display. The NPA text does not require the pedestrian to be out of the travelled way until “a conflicting vehicular movement is allowed to proceed. The NCUTCD recommends retaining the language that was originally submitted for the following reasons:

While the pedestrian can reasonably be expected to anticipate and know when the zero will be displayed, they canon be expected to anticipate and know when a conflicting vehicle movement is permitted. The pedestrian should always be able to see the countdown display as it is located at or near the far end of the crossing area. Furthermore, the pedestrian can observe the rate at which the countdown display changes as they are crossing the streets and can therefore anticipate when it will reach zero. This permits the pedestrian to adjust their crossing speed as needed to be out of the travelled

way by the time the zero is displayed. These benefits do not exist if the pedestrian is permitted to be in the travelled way until a conflicting vehicle movement is permitted. The zero will occur prior to this point – but the amount of time before this point will vary from crossing location to crossing location. Even if the crossing pedestrian is able to see the yellow indication, they do not know how long it will be displayed or whether a red clearance interval will follow. While the pedestrian may be able to see the conflicting movement when the green is displayed, this information is too late to help them in their crossing (other than to let them know they didn't make it in time) as they are already expected to be out of the travelled way at that point. From a safety standpoint, the pedestrian should be “safe” as long as they are out of the travelled way before the conflicting vehicle movement is permitted. The NCUTCD recommendation requiring pedestrians to be clear of the travelled way at the zero is requiring them to be clear while there is additional crossing time before a conflicting vehicle movement is permitted. However, permitting crossings to begin during a flashing don't walk display is already a major change from the current MUTCD. The NCUTCD recommendation provides a reasonable opportunity for many more pedestrian to begin and end their crossings safely than is permitted under the current MUTCD. It does so with conditions under which the pedestrians have sufficient information from easily viewable pedestrian signals to determine when they are expected to be clear of the travelled way. The NPA proposal is more generous in the crossing time permitted, but unfortunately does not necessary provide for appropriate indications available to the pedestrian to determine when they are expected to be clear of the travelled way. The NCUTCD recommended language is a shown below.

- B. A flashing UPRAISED HAND (symbolizing DONT WALK) signal indication means that a pedestrian shall not start to cross the roadway in the direction of the signal indication, but that any pedestrian who has already started to cross on a steady WALKING PERSON (symbolizing WALK) signal indication shall proceed ~~out~~ to the far side of the traveled way of the street or highway, unless otherwise directed by ~~signs or signals~~ a traffic control device to proceed only to the median of a divided highway or only to some other island or pedestrian refuge area. If a countdown pedestrian signal indication is ~~also~~ shown, pedestrians shall be permitted to leave the curb ~~or shoulder~~ if they are able to travel to the far side of the traveled way or to a median of sufficient width for pedestrians to wait by the time the countdown pedestrian signal displays zero a conflicting vehicular movement is allowed to proceed.**

## Section 4E.03 Application of Pedestrian Signal Heads

4.44 4E.03 Pg 894 Ln 8-12

The addition of the phrase “approaching the intersection or midblock location” as shown clarifies that the display of a red indication is required for movements approaching the crosswalk. While it can be argued that the NPA text noting “conflicting traffic” covers this, the addition of this phrase removes any potential ambiguity.

**Standard:**

**When the pedestrian signal heads associated with a crosswalk are displaying either a steady WALKING PERSON (symbolizing WALK) or a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication, a steady or a flashing red signal indication shall be shown to any conflicting vehicular movement that is approaching the intersection or midblock location perpendicular or nearly perpendicular to the crosswalk.**

**Section 4E.04 Size, Design, and Illumination of Pedestrian Signal Head Indications**

4.45 4E.04 Pg 894 Ln 47-48

Text modified to be consistent with parallel text in the last paragraph of Section 4D.04.

**If the pedestrian signal indication is so bright that it as to causes excessive glare in during nighttime conditions, some form of automatic dimming should be used to reduce the brilliance of the signal indication.**

**Section 4E.06 Accessible Pedestrian Signals**

4.46 4E.06 Pg 896 Ln 22-24

Page 897 lines 27-29 require speech messages in cases where it is infeasible to separate the pedestrian signals by at least 10 feet. Therefore, in these cases, the audible walk indication would not be a percussive tone. The proposed change provides for consistency with the text on page 897.

**Where two accessible pedestrian signals are separated by a distance of at least 3 m (10 ft), the audible walk indications shall be a percussive tone. Where two accessible pedestrian signals on one corner are not separated by a distance of at least 3 m (10 ft), the audible walk indication shall be a speech message.** Audible tone walk indications shall repeat at 8 to 10 ticks per second. Audible tones used as walk indications shall consist of multiple frequencies with a dominant component at 880 Hz.



## Section 4E.07 Countdown Pedestrian Signals

4.47 4E.07 Pg 898 after Ln 42

It is recommended that an option statement be added indicating that it is permissible to install countdown displays for all crosswalks at a traffic control signal as follows:

**Option:**

A pedestrian interval countdown display may be installed in conjunction with pedestrian signals at some or all crosswalks at any traffic control signal.

4.48 4E.07 Pg 898 Ln 43-50

It is recommended that, as listed in the NPA, most new pedestrian signal heads include countdown displays. However, the threshold condition to permit pedestrian signal heads without countdown displays should be changed to a higher value. A countdown from 3 to 0 is so short it could be missed by a distracted or unobservant pedestrian. A 7 second value is recommended. This would provide for consistency with the recommended minimum value for the walk interval listed in Section 4E.10. In the case of the walk interval, 7 seconds is recommended so that pedestrians have adequate opportunity to leave the curb or shoulder before the pedestrian clearance time begins. Since it is proposed to permit pedestrians to begin crossing during the countdown display, a countdown display comparable to the minimum walk intervals seems logical to permit pedestrians to leave the curb or shoulder before the countdown display ends.

Rewording the first sentence as shown below eliminates the need for the second sentence. It is therefore recommended for deletion.

**Option Standard:**

~~Except at crosswalks that are so short that the duration of~~ **All pedestrian signal heads where the pedestrian change interval is 3 seconds or less more than 7 seconds; all new pedestrian signal heads shall include a pedestrian change interval countdown display** ~~may be added to a pedestrian signal head~~ **in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval. A pedestrian change interval countdown display shall be added to all existing pedestrian signal heads, except those being used for crosswalks that are so short that the duration of the pedestrian change interval is 3 seconds or less, within the 10-year compliance period specified in the Introduction of this Manual.**

4.49 4E.07 Pg 899 before Ln 1

The following recommended addition is consistent with the intent of the NPA language concerning the use of countdown pedestrian signals. However, it additionally clearly specified the condition under which the countdown display is to be active.

**When Countdown Pedestrian Signals are used, the countdown shall always be displayed simultaneously with the flashing UPRAISED HAND (symbolizing DONT WALK) signal on each crosswalk.**

4.50 4E.07 Pg 899 Ln 8-11

The following changes concerning permitting the countdown display during a yellow change interval is needed because of and consistent with recommended modifications to pedestrian intervals in Section 4E.10. The changes in Section 4E.10 will permit the countdown display to continue into the yellow change interval. Note: it does not have to count down throughout the entire yellow change interval. The countdown may terminate during the yellow change interval. For the purpose of Section 4E.07, the countdown display is prohibited only during the walk interval and the red clearance interval.

~~If used,~~ The countdown pedestrian signal shall display the number of seconds remaining until the termination of the pedestrian change interval (flashing UPRAISED HAND). Countdown displays shall not be used during the walk interval or during the ~~yellow change~~ red clearance interval of a concurrent vehicular phase.

4.51 4E.07 Pg 899. Ln 12-27

Countdown displays are required to display the countdown only in conjunction with the flashing don't walk indication. They are to be dark at other times. Therefore, the following text marked for deletion is not needed.

Guidance:

If used with a pedestrian signal head that does not have a concurrent vehicular phase, the pedestrian change interval (flashing UPRAISED HAND) should be set to be approximately 4 seconds less than the required pedestrian crossing time (see Section 4E.10) and an additional clearance interval (during which a steady UPRAISED HAND is displayed) should be provided prior to the start of the conflicting vehicular phase. ~~In this case, the countdown pedestrian signal should display of the number of remaining seconds should be displayed~~ only during the display of the flashing UPRAISED HAND, should display zero at the time when the flashing UPRAISED HAND changes to a steady UPRAISED HAND, and should be dark during the additional clearance interval prior to the ~~start of a~~ conflicting vehicular phase.

Standard:

If a concurrent vehicular green indication continues to be displayed after the display of the flashing UPRAISED HAND has terminated, such as when an actuated phase has a maximum green interval that is longer than the pedestrian crossing time or when the duration of the green interval for a parallel concurrent vehicular movement has been intentionally set higher than the pedestrian clearance time to provide turning drivers additional green time to make their turns (see Section 4E.10), the countdown pedestrian signal shall be dark during the additional green time.

## Section 4E.08 Pedestrian Detectors

It is recommended to add “physical” as shown in the following places in 4E.08 to emphasize that it is physical conditions that should be considered when determining whether it is determined to be impractical.

4.52 4E.08 Pg 900. Ln 8-9

Where there are **physical** constraints that make it impractical to place the pedestrian pushbutton adjacent to a level all-weather surface, the surface should be as level as feasible

4.53 4E.08 Pg 900. Ln 10-12

Where there are **physical** constraints that make it impractical to place the pedestrian pushbutton between 0.45 m (1.5 ft) and 1.8 m (6 ft) from the edge of the curb, shoulder, or pavement, it should not be farther than 3 m (10 ft) from the edge of curb, shoulder, or pavement.

4.54 4E.08 Pg 900 Ln 19-21

Where there are **physical** constraints on a particular corner that make it impractical to provide the 3 m (10 ft) of separation between the two accessible pedestrian pushbuttons, the pushbuttons may be placed closer together or on the same pole.

4.55 4E.08 Pg 901. Ln 3-6

The following paragraph is recommended to be reworded to improve clarity. It is recommended that the sign legend be changed to “push button for 2 seconds for extra crossing time”. While it is a fine distinction, the button is not held down – as in with force applied toward the ground, it is pressed. Obviously, this sign should not be in place unless an extended pushbutton press results in extra crossing time. Therefore, the revised wording adds information that the sign be installed whenever the extended pushbutton press always results in additional crossing time.

Standard:

If additional crossing time is provided by means of an extended pushbutton press will always provide additional crossing time, a ~~FOR MORE CROSSING TIME: HOLD BUTTON DOWN FOR 2 SECONDS~~ PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P) plaque (see Figure 2B-29) shall be mounted adjacent to or integral with the pedestrian pushbutton.

## Section 4E.09 Accessible Pedestrian Signal Detectors

4.56 4E.09 Pg 901 Ln 49-52

It is recommended to add “physical” as shown to emphasize that physical conditions at the location should be the condition that determines whether it is determined to be impractical to provide 10 feet of separation.

### Option:

Where there are physical constraints on a particular corner that make it impractical to provide the 3 m (10 ft) of separation between the two accessible pedestrian pushbuttons, the pushbuttons may be placed closer together or on the same pole.

4.57 4E.09 Pg 902 Ln 2-3

The prior option permits placement of push button either closer together or on the same pole. Therefore, the Standard needs to include the condition where they are on separate poles but closer together than 10 feet.

### **Standard:**

If two accessible pedestrian pushbuttons are less than 3 m (10 ft) apart or are placed on the same pole, each accessible pedestrian pushbutton shall be provided with the following features:

4.58 4E.09 Pg 902 Ln 25-27

The following paragraph should be reworded to improve clarity. It is recommended that the sign legend be changed to “push button for 2 seconds for extra crossing time”. While it is a fine distinction, the button is not held down – as in with force applied toward the ground, it is pressed. Obviously, this sign should not be in place unless an extended pushbutton press results in extra crossing time. Therefore, the revised wording adds information that the sign be installed whenever the extended pushbutton press always results in additional crossing time.

If additional crossing time is provided by means of an extended pushbutton press will always provide additional crossing time, a ~~FOR MORE CROSSING TIME: HOLD BUTTON DOWN FOR 2 SECONDS~~ PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P) plaque (see Figure 2B-29) shall be mounted adjacent to or integral with the pedestrian pushbutton.

## Section 4E.10 Pedestrian Intervals and Signal Phases

4.59 4E.10 Pg 903 Ln 12 through Pg 904 Ln 52

It is recommended that intervals associated with pedestrian movements be redefined as shown below. This is expected to reduce much existing confusion relating to pedestrian intervals. Rather than the overall pedestrian clearance time consisting of 3 intervals as in the current MUTCD, there would be only 2 – a pedestrian change interval and a buffer interval (perhaps this should be called the pedestrian buffer interval). Basically, the flashing don't walk and the pedestrian countdown display (when used) coincide with the pedestrian change interval. The buffer interval is a minimum 3 second period between the end of the flashing don't walk (and zero on any countdown display) and the time a conflicting vehicle movement is permitted. The sum of the pedestrian change interval and the buffer interval must equal or exceed the calculated pedestrian clearance time.

One effect of this is that, subject to controller capabilities, the flashing don't walk and countdown display will be permitted to extend into a yellow change interval. While current equipment may result in the FLASHING DONT WALK and countdown being displayed until the end of the yellow change interval, that would not be required by the proposed text. It is intended to permit these intervals to extend into the yellow change interval, but terminate within the yellow change interval and be followed by a steady don't walk and zero (followed by blank) countdown display for the remainder of the yellow change interval.

It is felt that an option should be included to allow the Countdown Pedestrian Signals to extend into the yellow change interval to allow for consistency with use of the flashing upraised hand (without countdown) now used extensively throughout the country, to minimize disruption of vehicular traffic and also to make the pedestrian change interval consistently and more closely approximate the clearance interval.

4E.10 Pg 903 Ln 12-32

~~A pedestrian clearance time shall begin immediately following the WALKING PERSON (symbolizing WALK) signal indication. The first portion of the pedestrian clearance time shall consist of a pedestrian change interval during which a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed. The remaining portions second portion, if used, shall consist of the yellow change interval and any red clearance interval (prior to a conflicting green being displayed, during which a flashing or steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed. The third portion, if used, shall consist of the red clearance interval (prior to a conflicting green being displayed),~~

during which a steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed.

**Following the WALKING PERSON (symbolizing WALK) signal indication shall be the pedestrian change interval consisting of a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication. Following the pedestrian change interval, a buffer interval consisting of a steady UPRAISED HAND (symbolizing DONT WALK) shall be displayed for at least 3 seconds prior to release of any conflicting vehicular movement. The sum of the time of the pedestrian change interval and the buffer interval shall not be less than the calculated pedestrian clearance time. The buffer interval shall not begin later than the beginning of the red clearance interval, if used.**

Option:

The flashing UPRAISED HAND (symbolizing DONT WALK) indication may be displayed during the yellow change interval.

The steady UPRAISED HAND (symbolizing DONT WALK) indication may be displayed during the yellow change interval.

Option:

The pedestrian clearance time may be:

- A. Entirely contained within the vehicular green interval, such that the yellow change and red clearance intervals provide pedestrians with crossing time in addition to that calculated for the pedestrian clearance time;
- B. Entirely contained within the vehicular green and yellow change intervals, such that the red clearance interval provides pedestrians with crossing time in addition to that calculated for the pedestrian clearance time; or
- C. Entirely contained within the vehicular green, yellow change, and red clearance intervals.

4E.10 Pg 904 Ln 4-11

Support:

~~The walk interval itself need not equal or exceed the pedestrian clearance time calculated for the roadway width, because many pedestrians will complete their crossing during the pedestrian clearance time.~~ The walk interval is usually shorter than the pedestrian clearance time calculated for the roadway width, because the walk interval is intended only for pedestrians to start their crossing. The pedestrian clearance time is intended to allow pedestrians who started crossing during the walk interval to complete their crossing. Longer walk intervals are often used when the duration of the vehicular green phase associated with the pedestrian crossing is long enough to allow it.

4.60 4E.10 Pg 904 Ln 29-35

“Conflicting” added for clarification that the high turning movements of concern at the intersection are those that conflict with the high pedestrian volumes.

Option:

During the transition into preemption, the walk interval and the pedestrian change interval may be shortened or omitted as described in Section 4D.27.

At intersections with high pedestrian volumes and high conflicting turning vehicle volumes, a brief leading pedestrian interval, during which an advance WALKING PERSON (symbolizing WALK) indication is displayed for the crosswalk while red indications continue to be displayed to parallel through and/or turning traffic, may be used to reduce conflicts between pedestrians and turning vehicles.

4.61 4E.10 Pg 904 after Ln 35

Persons with limited or no visibility are often advised to begin a street crossing based on an audible cue when the parallel vehicles begin their movement. Since this audible cue may be unfamiliar to many users of the MUTCD, it is recommended to add a support statement.

**Support:**

Consideration of the use of an accessible pedestrian signal is recommended where a leading pedestrian indication is used because without the accessible features, pedestrians who are visually impaired can be expected to begin crossing at the onset of vehicular movement when drivers are not expecting them to begin crossing.

4.62 4E.10 Pg 904 after Ln 36

If a leading pedestrian interval is used, the audible cue often used to determine the beginning of the walk indication is no longer present. As a result, it is recommended that a guidance statement be added indicating an accessible pedestrian signal be considered when a leading pedestrian interval is used.

**Guidance:**

When a leading pedestrian interval is used, the use of an accessible pedestrian signal should be considered.

4.63 4E.10 Pg 904 Ln 37-49.

Leading pedestrian intervals are often used where there are high volumes of both pedestrians and conflicting vehicular traffic. It facilitates the pedestrian movement by permitting the pedestrians to begin their crossing before the adjacent vehicles receive a green indication. If pedestrian and vehicular volumes are such that a leading pedestrian interval is considered appropriate, consideration of prohibiting

turns across the crosswalk during the leading pedestrian interval is appropriate. The NPA text includes such a guidance statement along with 3 possible methods of enacting the prohibition. It is recommended that the list of some or all methods of enacting the prohibition be deleted and the guidance statement simply indicate that the prohibition should be considered.

Since the list of methods is proposed to be removed, the option statement relating to the use of a changeable message sign is also no longer needed.

Guidance:

When a leading pedestrian indication is used, it should be no less than 3 seconds in duration and should be timed to allow pedestrians to cross at least one lane of traffic before turning traffic is released. When a leading pedestrian interval is used, consideration should be given to prohibiting turns across the crosswalk during the leading pedestrian interval. During a leading pedestrian interval, right turns across the crosswalk should be prohibited by the display of:

A. A steady RED ARROW indication in a separate right turn signal face, a flashing yellow arrow signal face, or a flashing red arrow signal face (see Sections 4D.21 through 4D.24);

B. Steady CIRCULAR RED indications for the approach, accompanied by the display of a NO TURN ON RED (R10-11) or No Right Turn (R3-1) message on a changeable message or blank out sign; or

C. Steady green indications for the approach, accompanied by the display of a No Right Turn (R3-1) message on a changeable message or blank out sign.

Option:

If a static NO TURN ON RED (R10-11) sign or No Right Turn (R3-1) sign is in place to prohibit such movements on a full-time or part-time basis (see Section 2B.59), a changeable message or blank out sign may not be needed.

4.64 4E.10 Pg 904 Ln 50 through Pg 905 Ln 2

This information was considered to be support rather than an option. It provides information on signal operation that users are permitted to utilize even if this statement were not included. Such operation is not otherwise prohibited or restricted. Therefore, support seems to be a better category.

Support:

At intersections with pedestrian volumes that are so high that drivers have difficulty finding an opportunity to turn across the crosswalk, the duration of the green interval for a parallel concurrent vehicular movement may be is sometimes intentionally set higher than the pedestrian clearance time to provide turning drivers additional green time to make their turns while the pedestrian signal head is displaying a steady UPRaised



[HAND \(symbolizing DONT WALK\) signal indication after pedestrians have had time to complete their crossings.](#)

## CHAPTER 4F PEDESTRIAN HYBRID ~~SIGNALS~~ BEACONS

There are two major issues addressed within this Chapter. The NCUTCD recommends renaming a pedestrian hybrid signal as a pedestrian hybrid beacon to minimize potential problems with requirements in some jurisdictions for vehicular traffic to stop at dark traffic signals. The NCUTCD also recommends requiring simultaneous rather than alternating red flash with pedestrian hybrid beacons.

4.65 4F.ALL Pg 906 Ln 1 through Pg 908 Ln 10

It is recommended to change “pedestrian hybrid signal” to “pedestrian hybrid beacon” throughout the MUTCD. The operation of these devices includes displays common to both signals and beacons. This recommended change is based on: 1. their operation as dark between actuations makes them more like a beacon than a signal, and 2. characterization as a signal could create potential confusion in states that require approaching vehicles to stop at a dark traffic control signal. These were specifically intended to not be considered traffic control signals and the arrangement of the signal face with two red sections over a single yellow section was intended to strengthen this intention. Calling it a “pedestrian hybrid signal” introduces potential confusion. Therefore, the term “pedestrian hybrid beacon” is preferred by the NCUTCD.

### Section 4F.03 Operation of Pedestrian Beacons Hybrid Signals

4.66 4F.03 Pg 907 Ln 38-52.

In order to continue to have alternating horizontal flashing red indications only at rail crossings, the flashing display for pedestrian hybrid signals is recommended to be specified as simultaneous flash. This applies to all red indications in all faces facing a given approach.

**Upon actuation by a pedestrian, a pedestrian hybrid signal face shall display a flashing CIRCULAR YELLOW signal indication, followed by a steady CIRCULAR YELLOW signal indication, followed by both steady CIRCULAR RED signal indications during the pedestrian walk interval, followed by alternating simultaneous flashing CIRCULAR RED signal indications during the pedestrian clearance interval (see Figure 4F-3). Upon termination of the pedestrian clearance interval, the pedestrian hybrid signal faces shall revert to a dark (not illuminated) condition. When flashing CIRCULAR RED indications are displayed, all**

**CIRCULAR RED indications in all signal faces facing an approach shall flash simultaneously.**

Except as noted in the Option below, the pedestrian signal heads shall continue to display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid signal faces are either dark or displaying flashing or steady CIRCULAR YELLOW signal indications. The pedestrian signal heads shall display a WALKING PERSON (symbolizing WALK) signal indication when the pedestrian hybrid signal faces are displaying steady CIRCULAR RED signal indications. The pedestrian signal heads shall display a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid signal faces are displaying simultaneous flashing CIRCULAR RED signal indications. Upon termination of the pedestrian clearance interval, the pedestrian signal heads shall revert to a steady UPRAISED HAND (symbolizing DONT WALK) signal indication.

#### **CHAPTER 4G. TRAFFIC CONTROL SIGNALS AND HYBRID SIGNALS BEACONS FOR EMERGENCY VEHICLE ACCESS**

There are two major issues addressed within this Chapter. The NCUTCD recommends renaming a hybrid signal as a hybrid beacon to minimize potential problems with requirements in some jurisdictions for vehicular traffic to stop at dark traffic signals. The NCUTCD also recommends requiring simultaneous rather than alternating red flash with hybrid beacons.

4.67 4G.04 Pg 910 Ln 1 through Pg 911 Ln 39

It is recommended to change “hybrid signal” to “hybrid beacon” throughout the MUTCD. The operation of these devices includes displays common to both signals and beacons. This recommended change is based on: 1. their operation as dark between actuations makes them more like a beacon than a signal, and 2. characterization as a signal could create potential confusion in states that require approaching vehicles to stop at a dark traffic control signal. These were specifically intended to not be considered traffic control signals and the arrangement of the signal face with two red sections over a single yellow section was intended to strengthen this intention. Calling it a “hybrid signal” introduces potential confusion. Therefore, the term “hybrid beacon” is preferred by the NCUTCD.

4.68 4G.04 Pg 911 Ln 3-10

In order to continue to have alternating horizontal flashing red indications only at rail crossings, the flashing display for pedestrian hybrid beacons is recommended

to be specified as simultaneous flash. This applies to all red indications in all faces facing a given approach.

Upon actuation by authorized emergency personnel, the emergency-vehicle hybrid signals beacons shall display a flashing yellow signal indication, followed by a steady yellow change interval, prior to displaying two CIRCULAR RED signal indications in an alternating a simultaneous flashing array for a duration of time adequate for egress of the emergency vehicles. The simultaneous flashing red signal indications shall only be displayed when it is required that drivers on the major street stop and then proceed subject to the rules applicable after making a stop at a STOP sign. When flashing CIRCULAR RED indications are displayed, all CIRCULAR RED indications in all signal faces facing an approach shall flash simultaneously. Upon termination of the flashing red signal indications, the emergency-vehicle hybrid signals beacons shall revert to a dark mode (no indications displayed) condition.

#### **CHAPTER 4H. TRAFFIC CONTROL SIGNALS FOR ONE-LANE TWO-WAY FACILITIES**

4.69 4H Pg 912 Ln 1-34

The NCUTCD concurs with Chapter 4H as proposed in the NPA.

#### **CHAPTER 4I. TRAFFIC CONTROL SIGNALS FOR FREEWAY ENTRANCE RAMPS**

The NCUTCD concurs with Chapter 4I as proposed in the NPA except for the proposed requirement to provide 2 signal faces for each lane of a multi-lane ramp when simultaneous green indications are not shown to all lanes .

##### **Section 4I.02 Design of Freeway Entrance Ramp Control Signals**

4.70 4I.02 Pg 913 Ln 50 through Pg914 Ln 4

Due to physical challenges of providing two signal faces for each approach of a multi-lane approach with non-simultaneous green indications, it is recommended that only one signal face per lane be required. A photo of a three lane metered ramp was reviewed. Each lane was controlled by a separate signal faces with all three faces mounted on a single mast arm. Only one of the three lanes had a green indication at a given time. It appeared possible that the second face per approach lane could have been satisfied by adding ground mounted faces adjacent to each of the outside lanes. However, the second face for the center approach lane would have to be mounted on the mast arm. Relocating the existing signal face for the center lane and adding the second face with 8 feet separation between them would place these signal faces much closer to the adjacent ramp lanes and increase the

likelihood of someone in one of the outside lanes mistaking one of these as their lane control. It was felt that a single signal face per lane provided sufficient indications and permitted installation location flexibility

If only one lane is present on an entrance ramp or if more than one lane is present on an entrance ramp and the ramp control signals are operated such that green signal indications are always displayed simultaneously to all of the lanes on the ramp, then a minimum of two signal faces per ramp shall face entering traffic. If more than one lane is present on an entrance ramp and the ramp control signals are operated such that green signal indications are not always displayed simultaneously to all of the lanes on the ramp, then each separately-controlled lane or lanes shall be provided with a minimum of ~~two~~ one signal faces.

## CHAPTER 4J. TRAFFIC CONTROL SIGNALS FOR MOVABLE BRIDGES

The NCUTCD concurs with Chapter 4J as proposed in the NPA except for the deletion of a duplicated sentence.

### Section 4J.02 Design and Location of Movable Bridge Signals and Gates

4.71 4J.02 Pg 915 Ln 36-38

Delete duplicate sentence. This sentence will remain in Page 916 Ln 5 & 6.

#### Guidance:

~~Movable bridge warning gates should be of lightweight construction. In its normal upright position, the gate arm should provide adequate lateral clearance.~~

## CHAPTER 4K. TOLL PLAZA TRAFFIC SIGNALS

### Section 4K.01 Traffic Signals at Toll Plazas

4.72 4K.01 Pg 918 Ln 1-38

The NPA included this as a new chapter. It addresses the use of traffic signal faces at toll plazas that are used to control the flow of traffic passing the toll plaza. These signals generally display a red indication until a toll is paid, through any of the various collection methods, followed by a green indication for a short period of time to indicate it is OK to proceed. The text notes that these are similar to ramp metering. The proposed new chapter does not require the use of traffic control

signals to provide these indications, it simply lists it as an option. Many toll facility operators choose to provide these type indications at toll plazas. However, a variety of devices, including traffic control signals, are used to do so. It was noted that devices other than traffic control signals are being successfully used by some toll agencies. For toll facilities with electronic toll collection or pay by mail options, there are often lanes at the plaza that do not require vehicles to stop or slow as they pass the plaza. These lanes typically have no lane control signals. Due to the varied applications, lack of requirement to even provide these type indications, and alternative devices available, it is recommended that the NPA text for new chapter 4K be deleted and be replaced with a standard statement prohibiting the use of traffic control signals and devices that resemble traffic control devices with red or green circular indications at toll plazas. As with the NPA proposed text, this does not address signals used to indicated the open or closed status of a lane to approaching traffic. That remains in Section 4M.01 in the lane use control chapter.

With the expansion of the MUTCD to all roads open to public travel, including those on private property, many other situations may now be subject to the MUTCD. The current MUTCD and the NPA text do not address things such as drive through bank facilities that often use the red and green sections of a traffic control signal to indicate their open or closed status. While there may be some question about whether such lanes constitute a road open to public travel, there are these type application on private property that use traffic control signals for various purposes. No recommendation is proposed at this time, but possible MUTCD language to address such applications may be appropriate in the future.

**Standard:**

**Traffic control signals or devices that closely resemble traffic control signals that use red or green circular indications shall not be used at toll plazas.**

**Section 4K.01 Traffic Signals at Toll Plazas**

**Option:**

**Traffic control signal faces may be used at toll plazas to control the flow of traffic through certain lanes of the plaza, in a manner similar to ramp metering (see Chapter 4I).**

**Standard:**

**Traffic control signal faces used at toll plazas shall comply with the provisions of Chapter 4D, except as otherwise noted in Chapter 4K.**

**Guidance:**

When used, each toll plaza signal face should consist of a minimum of two 200 mm (8 in) or two 300 mm (12 in) signal sections, and should be post-mounted approximately 4.6 m (15 ft) beyond the downstream edge of the vehicle detector that detects vehicles that are departing from the toll plaza.

Option:

When used, only one toll plaza signal face is required for each lane and each such signal face may be mounted with lateral and vertical clearances that are less than those specified in Sections 4D.13, 4D.15, and 4D.16 for traffic control signals that are used at intersections.

As the only exception to the prohibition stated in Section 4D.04, signal faces at toll plazas may include lettering on their lenses.

Guidance:

Signal faces with circular red and circular green signal indications should be used for attended and exact change cash lanes. The red signal indication should be displayed at all times except during a short green interval to release a vehicle after payment has been made.

Signal faces with circular yellow and circular green signal indications should be used for dedicated non-stopping electronic toll collection lanes that are located within a toll plaza. The signal face should be placed in the dark mode (no indications displayed) until a vehicle approaches the toll plaza. When the non-stopping vehicle reaches the point where the signal face can be viewed, the signal face should briefly display a green signal indication if the electronic payment is accepted or briefly display a yellow signal indication if the vehicle's electronic toll collection account has a low balance.

Option:

Signal faces with circular yellow and circular green signal indications may also be used for open road electronic toll collection lanes that are not located within the toll plaza.

Guidance:

Signal faces that are used for open road electronic toll collection lanes should be operated in the same manner as the signal faces that are used for dedicated non-stopping electronic toll collection lanes that are located within toll plazas.

Support:

Section 4M.01 contains provisions regarding the use of lane use control signals at toll plazas.

## CHAPTER 4L. FLASHING BEACONS

The NCUTCD concurs with Chapter 4L as proposed in the NPA except for minor text changes to 4L.03.

### Section 4L.03 Warning Beacon

4.73 4L.03 Pg 920 Ln 37-40

Based on input received from a toll and managed lane task force, two minor clarifying wording changes are recommended to Section 4L.03. It was noted that the beacons are generally not mounted directly on the attenuators and that the term pylons is commonly used but the NPA term of ramparts is retained in parenthesis.

Warning Beacons that are mounted on toll plaza islands, ~~on~~ behind impact attenuators in front of toll plaza islands, and/or on toll booth pylons (ramparts) to identify them as objects in the roadway may be mounted at a height that is appropriate for viewing in a toll plaza context, even if that height is lower than the normal minimum of 2.4 m (8 ft) above the pavement.

4.74 4L.03 Pg 920 Ln 13-14

No change is recommended to these lines. However, the possible use of a steady burn warning beacon for use in conjunction with the crash attenuators at a toll plaza was requested by the toll and managed lane task force. This was discussed and considered inappropriate. By definition, a warning beacon is a flashing device. While they may be dark at times, when operating, they flash. Therefore, the idea of a steady burn warning beacon was rejected. The possibility of defining a new type device that would operate in a steady mode for use at toll plazas was also rejected. It was felt that the standard flashing warning beacon remains a device that is available to use to help identify the attenuator devices. Also, high visibility delineators could be used as an alternative. The introduction of a steady burn single section beacon was considered premature without thorough consideration of other possible applications or possible unintended consequences.

## **CHAPTER 4M. LANE-USE CONTROL SIGNALS**

The NCUTCD concurs with Chapter 4M as proposed in the NPA except for minor text changes to 4M.01.

### **Section 4M.01 Application of Lane-Use Control Signals**

4.75 4M.01 Pg 922 Ln 36-39

It is recommended to modify the NPA text as shown. It appears that the NPA text is intended to require a lane-use control signal only over lanes that may be closed at various times. Typically, an open road ETC lane would always be open, and would not require a lane-use control signal. The recommended wording change

simplifies the NPA text and maintains the original intent as the lane-use control signal is required to indicate the open or closed status of a controlled lane. The open road ETC lanes are not controlled – they are always open – so no lane use control signal would be required for them. However, this text would not prohibit a toll facility from providing lane-use control signals for open road ETC lanes if they desired to do so.

Standard:

At toll plazas, a lane-use control signal shall be installed above the center of each controlled lane that is not an Open Road electronic toll collection (ETC) toll plaza lane to indicate the open or closed status of the controlled lane.

## CHAPTER 4N. IN-ROADWAY LIGHTS

4.76 4N Pg 926 Ln 1 through Pg 927 Ln 32

The NCUTCD concurs with Chapter 4N as proposed in the NPA.

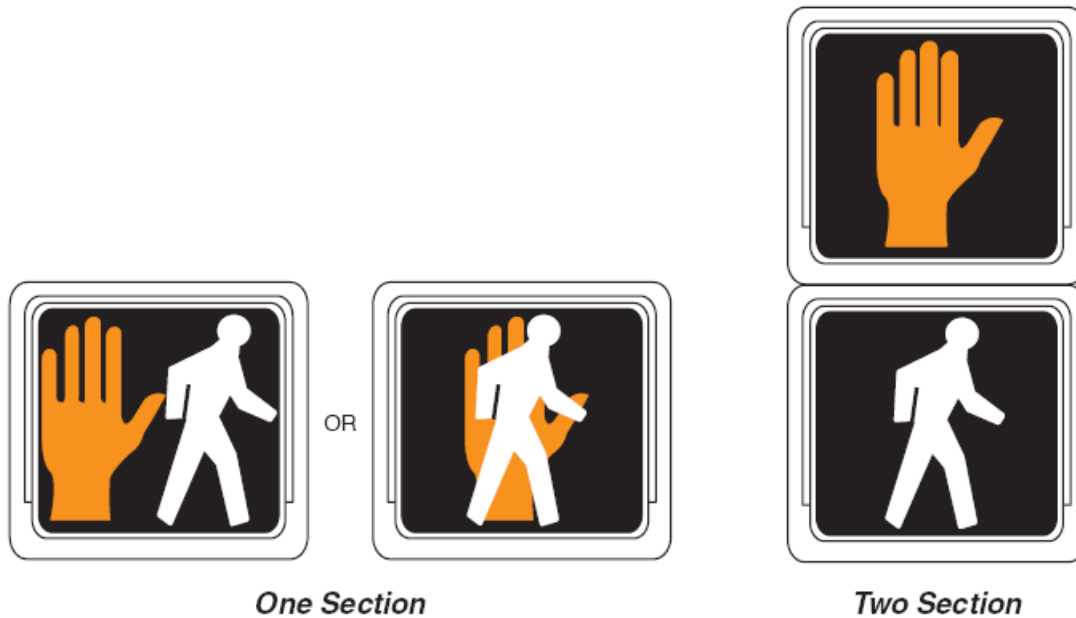


# Recommended changes to figures

## Approved by the NCUTCD Council – June 2008

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*Figure 4E-1. Typical Pedestrian Signal Indications*

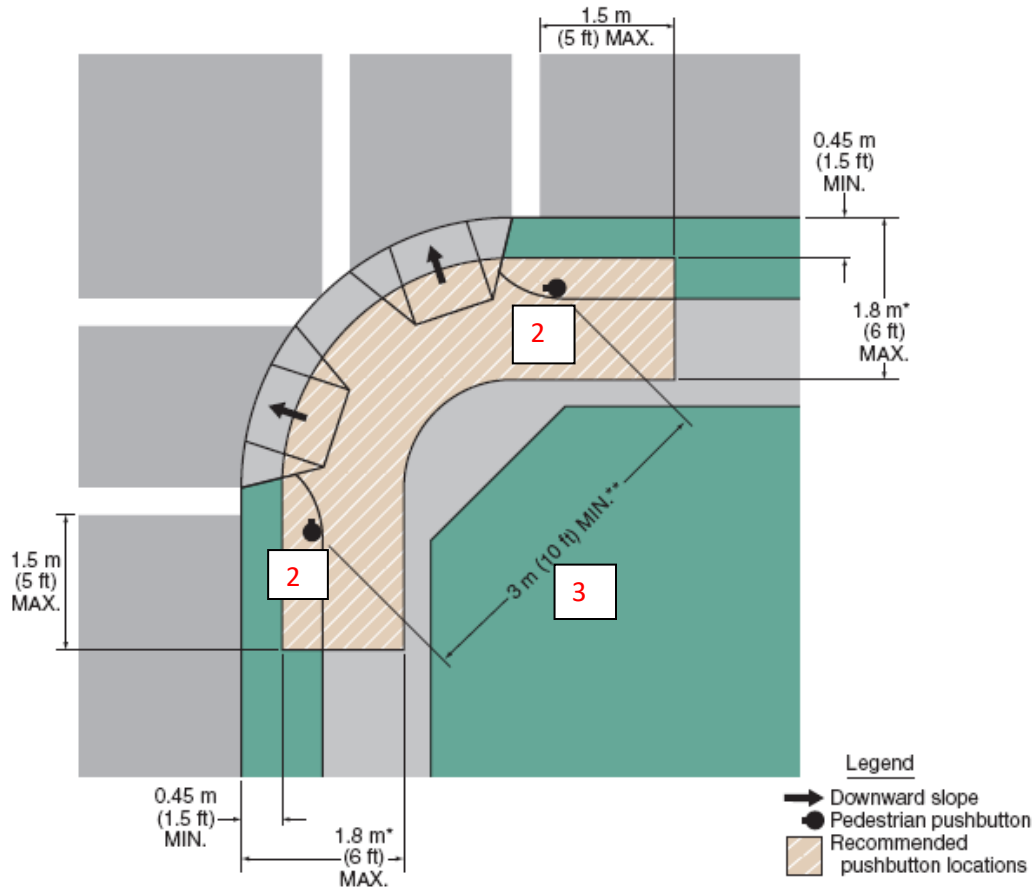


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Need two additional *typicals* to show Countdown Pedestrian Signals

- Integrated countdown with in a "One Section" unit
- Separate CPS signal unit showing the appropriate position relative to the standard pedestrian unit

Figure 4E-2. Recommended Pushbutton Locations

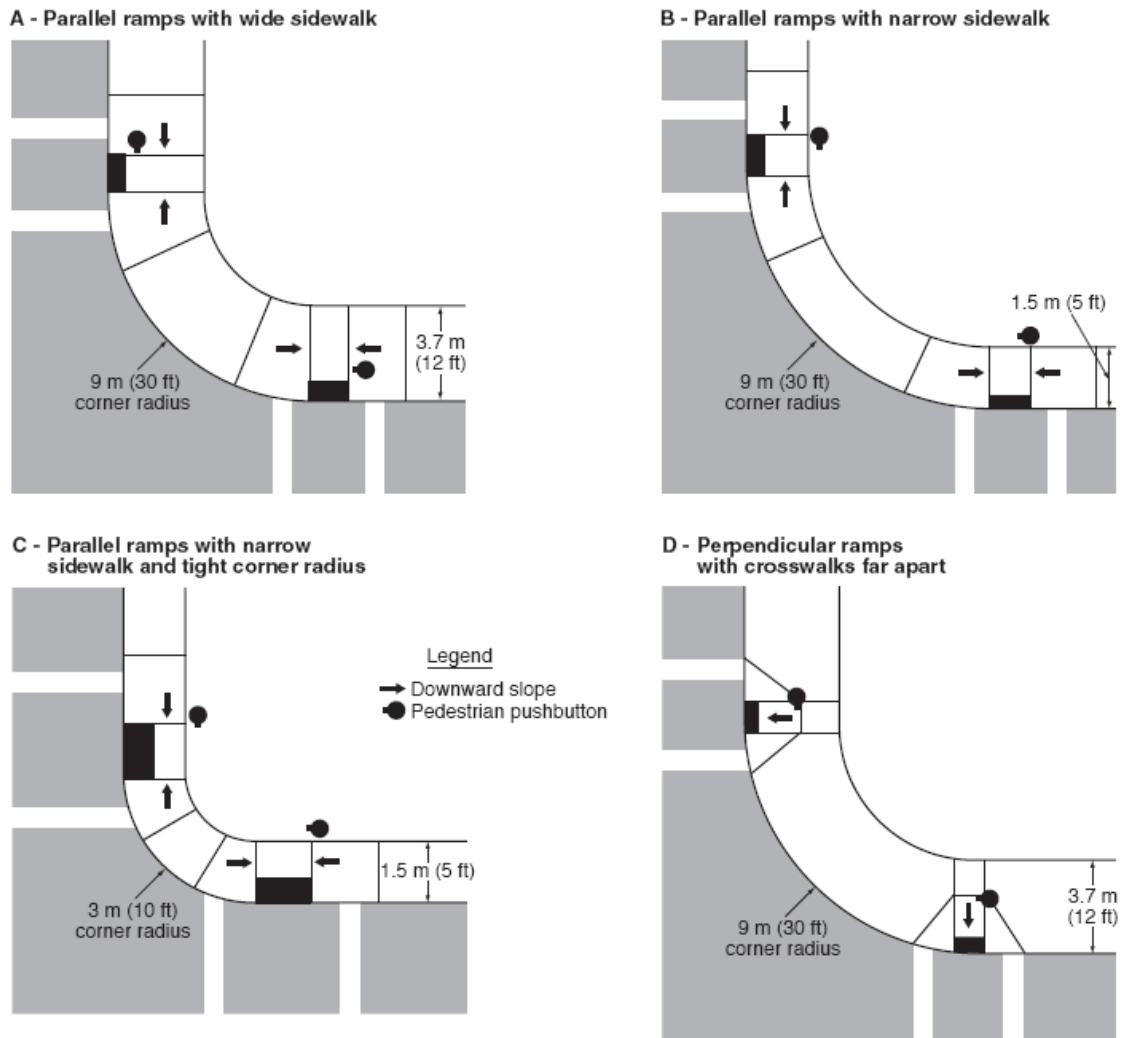


- 4 \* Where there are constraints that make it impractical to place the pedestrian pushbutton between 0.45 m (1.5 ft) and 1.8 m (6 ft) from the edge of the curb, shoulder, or pavement, it should not be further than 3 m (10 ft) from the edge of curb, shoulder, or pavement.
- 4 \*\* Where there are constraints on a particular corner that make it impractical to provide the 3 m (10 ft) separation between the two pedestrian pushbuttons, the pushbuttons may be placed closer together or on the same pole.

1. Change figure title to "Pushbutton Location Area"
2. Remove button symbol from the drawing as the button may be acceptably located throughout the shaded area.
3. Remove this dimension as it is between items that are to be removed.
4. Remove both of these asterisked notes, The practitioner who wishes to digress from the standard illustrated in the figure should see the full text of the section.
5. Add note that "Two pedestrian pushbuttons on a corner should be separated by 3m (10ft)."

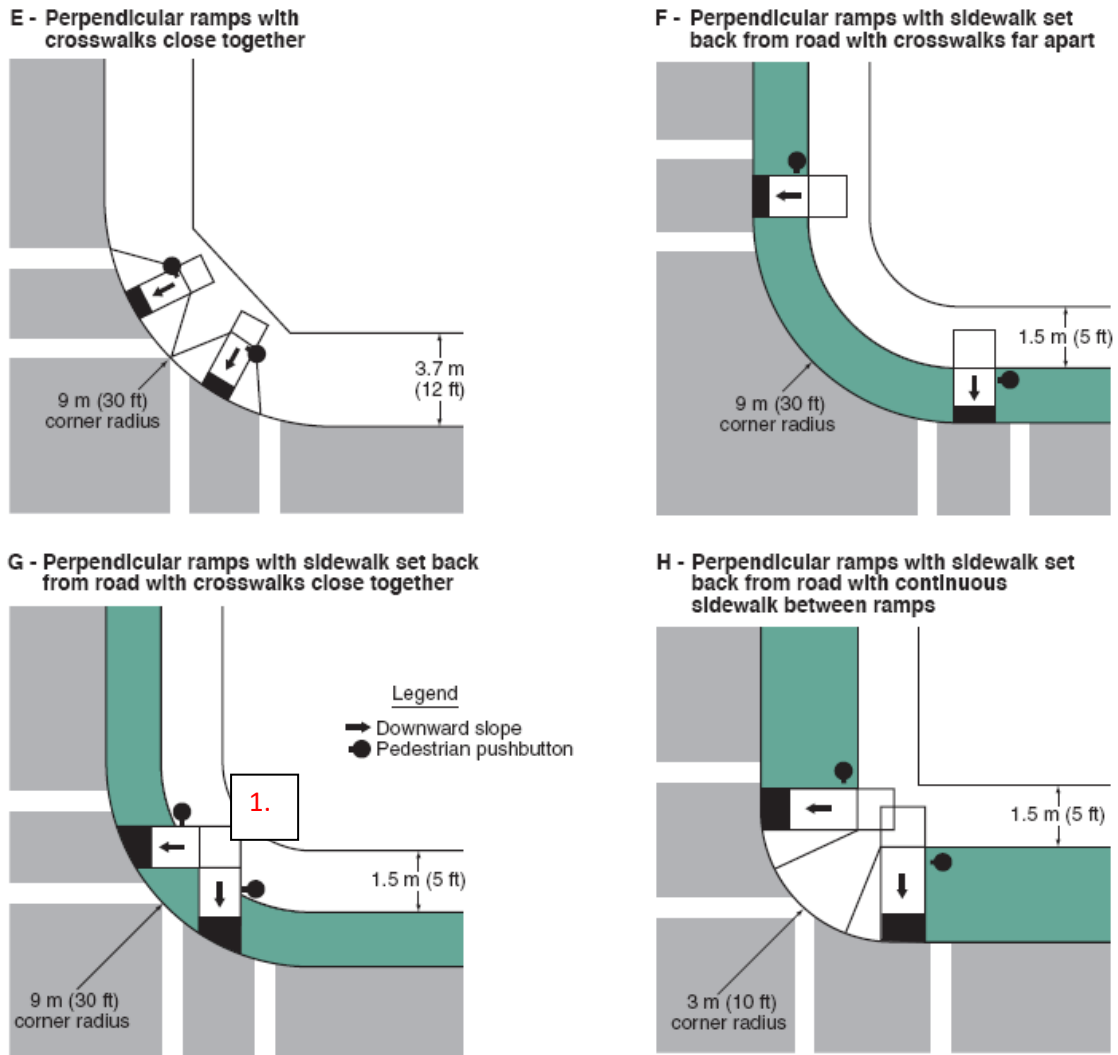
6. Clean-up drawing to correct the following:
  - Make the drawing proportionally correct by
    - reduce size of ramp compared to crosswalk or increase the size of crosswalk;
    - reduce the shaded area away from the intersection, so that the distance is proportional to the width of the sidewalk;
  - Correct the orientation of the ramps to the street/crosswalk, so that the ramp is aligned to the crosswalk;
  - Endeavour to draw the figure in a way that strives to be "to scale", however, after doing that, the figure should be labeled "not to scale".
  - Since the ramps are adjacent to landscape/grass area, there is no need for flares next to the grass
7. Add detectable warnings to the ramps shown here and add a legend entry for the detectable warning.

Figure 4E-3. Typical Pushbutton Locations (Sheet 1 of 2)

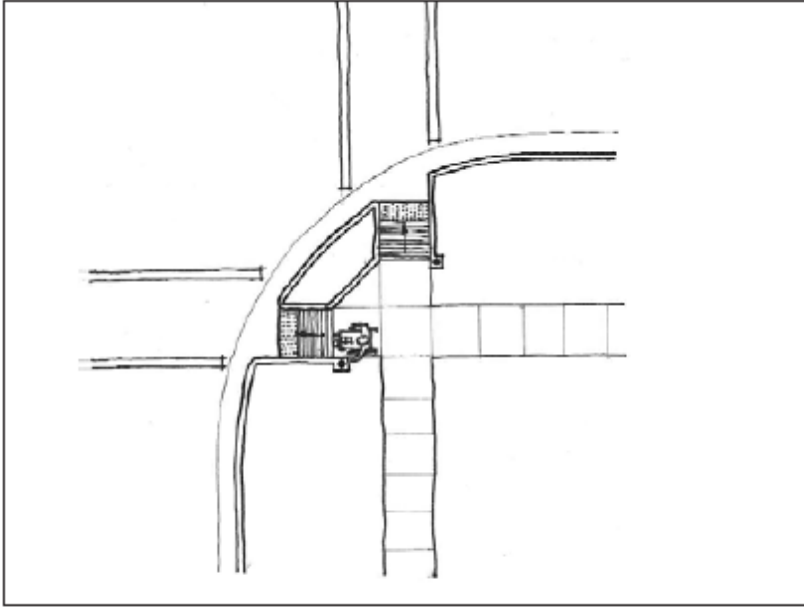


1. Add a legend for the detectable warning feature.
2. Shade the landing areas shown on the typical drawings and add a legend to explain the shading chosen.
3. Add "Not to Scale" note, while striving to provide the drawings more proportional.
4. Keep proportions as true as possible so that landing areas are "square" where not constrained by R-O-W or other issues.
5. These drawings are intended to describe the typical location to install a pedestrian pushbutton. They are not intended to be a guide for the design of the ramp.

Figure 4E-3. Typical Pushbutton Locations (Sheet 2 of 2)



1. Please correct the design of the ramp and its detectable warning in typical "G".
  - a. The bottom of a ramp is required by ADAAG to be perpendicular with ramp slope, so all four (4) wheels of a wheelchair remain in contact with the surface as the user transitions between the ramp and the street.
  - b. Therefore, the bottom of the detectable warning should be parallel to the top and there should be a triangle of level white space at the curb line.
  - c. See Figure 4d on page 30 in an article in ITE Journal April 2005 "Developing Curb Ramp Designs Based on Curb Radius". This figure is very similar to the typical G of this figure.(This figure is shown on the next page)
2. Same comments as the sheet 1 of 2 for this figure (4E-3).
3. These drawings are intended to describe the typical location to install a pedestrian pushbutton. They are not intended to be a guide for the design of the ramp.



**Figure 4d. 30-foot radius, return paired perpendicular, curbed, with parkway.**

Source: ITE Journal article – April 2005 - *Developing Curb Ramp Designs*

*Based on Curb Radius* by Edward R. Stollof, AICP