

## Task Force Review Part 4

### Comparison between current MN MUTCD and 2009 FHWA MUTCD and showing proposed MN MUTCD

MN MUTCD 2005 w/FHWA changes	FHWA 2009 MUTCD	Proposed MN MUTCD 2011	Recommendations
<p>4A.1 Types</p> <p><b>SUPPORT</b></p> <p>The following types and uses of highway traffic signals are discussed in Part 4: traffic control signals; <b>hybrid beacons</b>; pedestrian signals; emergency-vehicle <del>traffic control</del> signals; traffic control signals for one-lane, two-way facilities; traffic control signals for divided highways; traffic control signals for freeway entrance ramps; traffic control signals for movable bridges; <b>toll plaza traffic signals</b>; <b>flashing beacons</b>; lane-use control signals; <del>flashing beacons</del>; advance warning flashers, and in-roadway lights.</p> <p>4A.2 Definitions Relating to Highway Traffic Signals</p> <p><b>STANDARD:</b></p> <p><del>The following technical terms, when used in Part 4, shall be defined as follows:</del></p> <p><b>Support:</b> Definitions and acronyms pertaining to Part 4 are provided in Sections 1A.13 and 1A.14.</p> <p>All definitions deleted and moved to Chapter 1 – not shown in text here</p>	<p><b>Section 4A.01 Types</b></p> <p>Support:</p> <p>01 The following types and uses of highway traffic signals are discussed in Part 4: traffic control signals; pedestrian signals; hybrid beacons; emergency-vehicle signals; traffic control signals for one-lane, two-way facilities; traffic control signals for freeway entrance ramps; traffic control signals for movable bridges; toll plaza traffic signals; flashing beacons; lane-use control signals; and in-roadway lights.</p> <p><b>Section 4A.02 Definitions Relating to Highway Traffic Signals</b></p> <p>Support:</p> <p>01 Definitions and acronyms pertaining to Part 4 are provided in Sections 1A.13 and 1A.14.</p>	<p>4A.1 Types</p> <p><b>SUPPORT</b></p> <p>The following types and uses of highway traffic signals are discussed in Part 4: traffic control signals; hybrid beacons; pedestrian signals; emergency-vehicle signals; traffic control signals for one-lane, two-way facilities; traffic control signals for divided highways; traffic control signals for freeway entrance ramps; traffic control signals for movable bridges; toll plaza traffic signals; flashing beacons; lane-use control signals; advance warning flashers, and in-roadway lights.</p> <p>Section 4A.2 Definitions Relating to Highway Traffic Signals</p> <p>Support:</p> <p>Definitions and acronyms pertaining to Part 4 are provided in Sections 1A.13 and 1A.14</p>	<p>Begin 2-9-11 MCUTCD mtg</p> <p>Recommend adopting language change</p> <p>Recommend making change and moving definitions</p>

<p>CHAPTER 4B. TRAFFIC CONTROL SIGNALS—GENERAL</p> <p>4B.1 General</p> <p><b>STANDARD</b></p> <p><del>A traffic control signal (traffic signal) shall be defined as any highway traffic signal by which traffic is alternately directed to stop and permitted to proceed.</del></p> <p><del>Traffic shall be defined as pedestrians, bicyclists, ridden or herded animals, vehicles, streetcars, and other conveyances either singularly or together while using any highway for purposes of travel.</del></p> <p><b>SUPPORT</b></p> <p>Words such as pedestrians and bicyclists are used redundantly in selected sections of Part 4 to encourage sensitivity to these elements of "traffic."</p> <p>Standards for traffic control signals are important because traffic control signals need to attract the attention of a variety of road users, including those who are older, those with impaired vision, as well as those who are fatigued or distracted, or who are not expecting to encounter a signal at a particular location.</p> <p><del>Standards for traffic control signals are also important because signals need to function reliably under a wide range of conditions including day and night, adverse weather, and visually complex surroundings.</del></p>	<p><b>CHAPTER 4B. TRAFFIC CONTROL SIGNALS—GENERAL</b></p> <p><b>Section 4B.01 General</b></p> <p>Support:</p> <p>01 Words such as pedestrians and bicyclists are used redundantly in selected Sections of Part 4 to encourage sensitivity to these elements of "traffic."</p> <p>02 Standards for traffic control signals are important because traffic control signals need to attract the attention of a variety of road users, including those who are older, those with impaired vision, as well as those who are fatigued or distracted, or who are not expecting to encounter a signal at a particular location.</p>	<p>4B.1 General</p> <p><b>SUPPORT</b></p> <p>Words such as pedestrians and bicyclists are used redundantly in selected sections of Part 4 to encourage sensitivity to these elements of "traffic."</p> <p>Standards for traffic control signals are important because traffic control signals need to attract the attention of a variety of road users, including those who are older, those with impaired vision, as well as those who are fatigued or distracted, or who are not expecting to encounter a signal at a particular location.</p>	<p>Change per Fed document. Move definition to Chapter 1</p>
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<p>4B.2 Basis of Retention or Removal of Traffic Control Signals</p> <p>STANDARD:</p> <p><b>As with the installation of a traffic control signal, a comprehensive investigation and engineering study shall be completed to determine whether to remove or to retain a traffic control signal.</b></p> <p>SUPPORT</p> <p><b>The failure to satisfy any warrant is not in itself justification for removal of a signal.</b></p> <p>GUIDANCE</p> <p><del>Information should be obtained by means of engineering studies and compared with the requirements in “User Guide For Removal Of Not Needed Traffic Signals” 1. The engineering study should indicate whether the removal or retention of a traffic control signal will improve the overall safety and/or operation of the intersection.</del></p> <p>OPTION</p> <p><del>The need for retaining or removing a traffic control signal may be determined by the following criteria:</del></p> <p><del>1. A signalized intersection that does not meet 80 percent of the volume requirements of Warrant 1, but meets 60 percent of the volume requirements of Warrant 1 may be considered for removal. Engineering studies, findings, judgement, and documentation will be needed to justify retaining the traffic</del></p>	<p><b>Section 4B.02 Basis of Installation or Removal of Traffic Control Signals</b></p> <p><i>Guidance:</i></p> <p><i>01 The selection and use of traffic control signals should be based on an engineering study of roadway, traffic, and other conditions.</i></p> <p>Support:</p> <p>02 A careful analysis of traffic operations, pedestrian and bicyclist needs, and other factors at a large number of signalized and unsignalized locations, coupled with engineering judgment, has provided a series of signal warrants, described in Chapter 4C, that define the minimum conditions under which installing traffic control signals might be justified.</p> <p><i>Guidance:</i></p> <p><i>03 Engineering judgment should be applied in the review of operating traffic control signals to determine whether the type of installation and the timing program meet the current requirements of all forms of traffic.</i></p>	<p>4B.2 Basis of Retention or Removal of Traffic Control Signals</p> <p>STANDARD:</p> <p><b>As with the installation of a traffic control signal, a comprehensive investigation and engineering study shall be completed to determine whether to remove or to retain a traffic control signal.</b></p> <p>SUPPORT</p> <p><b>The failure to satisfy any warrant is not in itself justification for removal of a signal.</b></p> <p>Guidance:</p> <p>Engineering judgment should be applied in the review of operating traffic control signals to determine whether the type of installation and the timing program meet the current requirements of all forms of traffic.</p>	<p>MN Text</p> <p>Signal Committee suggested removing much of the Minnesota language and reverting to the Federal Language.</p> <p>This should be a discussion item.</p> <p>MN text to be removed is struck out in first column in black</p>
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<p><del>control signal.</del>  <b>2. A signalized intersection that does not meet 60 percent of the volume requirements of Warrant 1 and meets no other warrant should be considered not warranted and should be removed from operation.</b></p> <p><del>Other reasons may also be considered for removing a traffic control signal in addition to the volume parameters described above. Such reasons may include improvement of traffic operations, safety, and traffic control signal spacing considerations.</del></p> <p>STANDARD  <b>The decision to remove a traffic control signal shall follow the process set forth in the “User Guide For Removal of Not Needed Traffic Signals” 1. This decision must consider all study findings and engineering judgement.</b></p> <p><b>OPTION</b>  If the engineering study indicates that the traffic control signal is no longer justified, <del>and a decision is made to remove the signal,</del> removal <del>may</del> <b>should</b> be accomplished using the following steps:</p> <p>A. Determine the appropriate traffic control to be used after removal of the signal.  B. Remove any sight-distance restrictions as necessary.  C. Inform the public of the removal study, <del>for example by installing an informational sign (or signs) with the legend TRAFFIC SIGNAL UNDER STUDY FOR REMOVAL at the signalized location in a position where it is visible to all road users.</del>  D. Flash or cover the signal heads for a</p>	<p><i>04 If changes in traffic patterns eliminate the need for a traffic control signal, consideration should be given to removing it and replacing it with appropriate alternative traffic control devices, if any are needed.</i></p> <p><i>05 If the engineering study indicates that the traffic control signal is no longer justified, and a decision is made to remove the signal, removal should be accomplished using the following steps:</i></p> <p><i>A Determine the appropriate traffic control to be used after removal of the signal.</i>  <i>B. Remove any sight-distance restrictions as necessary.</i>  <i>C. Inform the public of the removal study.</i>  <i>D. Flash or cover the signal heads for a</i></p>	<p>If changes in traffic patterns eliminate the need for a traffic control signal, consideration should be given to removing it and replacing it with appropriate alternative traffic control devices, if any are needed.</p> <p>If the engineering study indicates that the traffic control signal is no longer justified, and a decision is made to remove the signal, removal should be accomplished using the following steps:</p> <p>A Determine the appropriate traffic control to be used after removal of the signal.  B. Remove any sight-distance restrictions as necessary.  C. Inform the public of the removal study.  D. Flash or cover the signal heads for a</p>	<p>Recommend adopting language changes, some MN language included in option: D</p>
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<p>minimum of 90 days, and install the appropriate stop control or other traffic control devices.</p> <p>E. Remove the signal if the engineering data collected during the removal study period confirms that the signal is no longer <b>justified</b>. <del>Instead of total removal of the traffic control signal, the poles and cables may remain in place for 1 year after removal of the signal heads for continued analysis.</del></p> <p><b>Option:</b> Because Items C, D, and E in Paragraph 5 are not relevant when a temporary traffic control signal (see Section 4D.32) is removed, a temporary traffic control signal may be removed immediately after Items A and B are completed.</p> <p>Instead of total removal of a traffic control signal, the poles, <b>controller cabinet</b>, and cables may remain in place after removal of the signal heads for continued analysis.</p> <p>Section 4B.3 Advantages and Disadvantages of Traffic Control Signals</p> <p>SUPPORT:</p> <p>When properly used, traffic control signals are valuable devices for the control of vehicular and pedestrian traffic. They assign the right-of-way to the various traffic movements and thereby profoundly influence traffic flow.</p> <p>Traffic control signals that are properly</p>	<p><i>minimum of 90 days, and install the appropriate stop control or other traffic control devices.</i></p> <p><i>E. Remove the signal if the engineering data collected during the removal study period confirms that the signal is no longer needed.</i></p> <p><b>Option:</b> 06 Because Items C, D, and E in Paragraph 5 are not relevant when a temporary traffic control signal (see Section 4D.32) is removed, a temporary traffic control signal may be removed immediately after Items A and B are completed.</p> <p>07 Instead of total removal of a traffic control signal, the poles, controller cabinet, and cables may remain in place after removal of the signal heads for continued analysis.</p> <p><b>Section 4B.03 Advantages and Disadvantages of Traffic Control Signals</b></p> <p>Support:</p> <p>01 When properly used, traffic control signals are valuable devices for the control of vehicular and pedestrian traffic. They assign the right-of-way to the various traffic movements and thereby profoundly influence traffic flow.</p>	<p>minimum of 90 days, and install the appropriate stop control or other traffic control devices. <b>All way red flash should not be used unless the intent is to have an all way stop after the removal of the signal.</b></p> <p>E. Remove the signal if the engineering data collected during the removal study period confirms that the signal is no longer <b>justified</b>.</p> <p><b>Option:</b> Because Items C, D, and E <b>above</b> are not relevant when a temporary traffic control signal (see Section 4D.32) is removed, a temporary traffic control signal may be removed immediately after Items A and B are completed.</p> <p>Instead of total removal of a traffic control signal, the poles, controller cabinet, and cables may remain in place after removal of the signal heads for continued analysis</p> <p>Section 4B.3 Advantages and Disadvantages of Traffic Control Signals</p> <p>SUPPORT:</p> <p>When properly used, traffic control signals are valuable devices for the control of vehicular and pedestrian traffic. They assign the right-of-way to the various traffic movements and thereby profoundly influence traffic flow.</p> <p>Traffic control signals that are properly</p>	<p>MN text</p> <p>MN text</p> <p>???language struck out not noted as MN language, but not showing in Federal as struck out</p> <p>Relocated from earlier paragraph</p> <p>No change</p>
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<p>designed, located, operated, and maintained will have one or more of the following advantages:</p> <p>A. They provide for the orderly movement of traffic.</p> <p>B. They increase the traffic-handling capacity of the intersection if:</p> <ol style="list-style-type: none"> <li>1. Proper physical layouts and control measures are used, and</li> <li>2. The signal operational parameters are reviewed and updated (if needed) on a regular basis (as engineering judgment determines that significant traffic flow and/or land use changes have occurred) to maximize the ability of the traffic control signal to satisfy current traffic demands.</li> </ol> <p>C. They reduce the frequency and severity of certain types of crashes, especially right-angle collisions.</p> <p>D. They are coordinated to provide for continuous or nearly continuous movement of traffic at a definite speed along a given route under favorable conditions.</p> <p>E. They are used to interrupt heavy traffic at intervals to permit other traffic, vehicular or pedestrian, to cross.</p> <p>Traffic control signals are often considered a panacea for all traffic problems at intersections. This belief has led to traffic control signals being installed at many locations where they are not needed, adversely affecting the safety and efficiency of vehicular, bicycle, and pedestrian traffic.</p> <p>Traffic control signals, even when justified by traffic and roadway conditions, can be ill-designed, ineffectively placed, improperly</p>	<p>02 Traffic control signals that are properly designed, located, operated, and maintained will have one or more of the following advantages:</p> <p>A. They provide for the orderly movement of traffic.</p> <p>B. They increase the traffic-handling capacity of the intersection if:</p> <ol style="list-style-type: none"> <li>1. Proper physical layouts and control measures are used, and</li> <li>2. The signal operational parameters are reviewed and updated (if needed) on a regular basis (as engineering judgment determines that significant traffic flow and/or land use changes have occurred) to maximize the ability of the traffic control signal to satisfy current traffic demands.</li> </ol> <p>C. They reduce the frequency and severity of certain types of crashes, especially right-angle collisions.</p> <p>D. They are coordinated to provide for continuous or nearly continuous movement of traffic at a definite speed along a given route under favorable conditions.</p> <p>E. They are used to interrupt heavy traffic at intervals to permit other traffic, vehicular or pedestrian, to cross.</p> <p><small>Sect. 4B.01 to 4B.03 December 2009 2009 Edition Page 435</small></p> <p>03 Traffic control signals are often considered a panacea for all traffic problems at intersections. This belief has led to traffic control signals being installed at many locations where they are not needed, adversely affecting the safety and efficiency of vehicular, bicycle, and pedestrian traffic.</p> <p>04 Traffic control signals, even when justified</p>	<p>designed, located, operated, and maintained will have one or more of the following advantages:</p> <p>A. They provide for the orderly movement of traffic.</p> <p>B. They increase the traffic-handling capacity of the intersection if:</p> <ol style="list-style-type: none"> <li>1. Proper physical layouts and control measures are used, and</li> <li>2. The signal operational parameters are reviewed and updated (if needed) on a regular basis (as engineering judgment determines that significant traffic flow and/or land use changes have occurred) to maximize the ability of the traffic control signal to satisfy current traffic demands.</li> </ol> <p>C. They reduce the frequency and severity of certain types of crashes, especially right-angle collisions.</p> <p>D. They are coordinated to provide for continuous or nearly continuous movement of traffic at a definite speed along a given route under favorable conditions.</p> <p>E. They are used to interrupt heavy traffic at intervals to permit other traffic, vehicular or pedestrian, to cross.</p> <p>Traffic control signals are often considered a panacea for all traffic problems at intersections. This belief has led to traffic control signals being installed at many locations where they are not needed, adversely affecting the safety and efficiency of vehicular, bicycle, and pedestrian traffic.</p> <p>Traffic control signals, even when justified by traffic and roadway conditions, can be ill-designed, ineffectively placed, improperly</p>	
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<p>operated, or poorly maintained. Improper or unjustified traffic control signals can result in one or more of the following disadvantages:</p> <ul style="list-style-type: none"> <li>A. Excessive delay;</li> <li>B. Excessive disobedience of the signal indications;</li> <li>C. Increased use of less adequate routes as road users attempt to avoid the traffic control signals; and</li> <li>D. Significant increases in the frequency of collisions (especially rear-end collisions).</li> </ul> <p>4B.4 Alternatives to Traffic Control Signals</p> <p><b>GUIDANCE</b></p> <p>Since vehicular delay and the frequency of some types of crashes are sometimes greater under traffic signal control than under STOP sign control, consideration should be given to providing alternatives to traffic control signals even if one or more of the signal warrants has been satisfied.</p> <p><b>OPTION:</b></p> <p>These alternatives may include, but are not limited to, the following:</p> <ul style="list-style-type: none"> <li>A. Installing signs along the major street to warn road users approaching the intersection;</li> <li>B. Relocating the stop line(s) and making other changes to improve the sight distance at the intersection;</li> </ul>	<p>by traffic and roadway conditions, can be ill-designed, ineffectively placed, improperly operated, or poorly maintained. Improper or unjustified traffic control signals can result in one or more of the following disadvantages:</p> <ul style="list-style-type: none"> <li>A. Excessive delay,</li> <li>B. Excessive disobedience of the signal indications,</li> <li>C. Increased use of less adequate routes as road users attempt to avoid the traffic control signals, and</li> <li>D. Significant increases in the frequency of collisions (especially rear-end collisions).</li> </ul> <p><b>Section 4B.04 Alternatives to Traffic Control Signals</b></p> <p><i>Guidance:</i></p> <p><i>01 Since vehicular delay and the frequency of some types of crashes are sometimes greater under traffic signal control than under STOP sign control, consideration should be given to providing alternatives to traffic control signals even if one or more of the signal warrants has been satisfied.</i></p> <p><b>Option:</b></p> <p>02 These alternatives may include, but are not limited to, the following:</p> <ul style="list-style-type: none"> <li>A. Installing signs along the major street to warn road users approaching the intersection;</li> <li>B. Relocating the stop line(s) and making other changes to improve the sight distance at the intersection;</li> <li>C. Installing measures designed to reduce speeds on the approaches;</li> <li>D. Installing a flashing beacon at the intersection to supplement STOP sign control;</li> </ul>	<p>operated, or poorly maintained. Improper or unjustified traffic control signals can result in one or more of the following disadvantages:</p> <ul style="list-style-type: none"> <li>A. Excessive delay;</li> <li>B. Excessive disobedience of the signal indications;</li> <li>C. Increased use of less adequate routes as road users attempt to avoid the traffic control signals; and</li> <li>D. Significant increases in the frequency of collisions (especially rear-end collisions).</li> </ul> <p>Section 4B.04 Alternatives to Traffic Control Signals</p> <p><b>Guidance:</b></p> <p>Since vehicular delay and the frequency of some types of crashes are sometimes greater under traffic signal control than under STOP sign control, consideration should be given to providing alternatives to traffic control signals even if one or more of the signal warrants has been satisfied.</p> <p><b>Option:</b></p> <p>These alternatives may include, but are not limited to, the following:</p> <ul style="list-style-type: none"> <li>A. Installing signs along the major street to warn road users approaching the intersection;</li> <li>B. Relocating the stop line(s) and making other changes to improve the sight distance at the intersection;</li> <li>C. Installing measures designed to reduce speeds on the approaches;</li> <li>D. Installing a flashing beacon at the intersection to supplement STOP sign control;</li> <li>E. Installing flashing beacons on warning signs in advance of a STOP sign controlled</li> </ul>	<p>Recommend making changes</p>
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<p>C. Installing measures designed to reduce speeds on the approaches;</p> <p>D. Installing a flashing beacon at the intersection to supplement STOP sign control;</p> <p>E. Installing flashing beacons on warning signs in advance of a STOP sign controlled intersection on major- and/or minor-street approaches;</p> <p>F. Adding one or more lanes on a minor-street approach to reduce the number of vehicles per lane on the approach;</p> <p>G. Revising the geometrics at the intersection to channelize vehicular movements and reduce the time required for a vehicle to complete a movement, which could also assist pedestrians;</p> <p><a href="#">H. Revising the geometrics at the intersection to add pedestrian median refuge islands and/or curb extensions;</a></p> <p><del>H.</del> I. Installing roadway lighting if a disproportionate number of crashes occur at night;</p> <p><del>I.</del> J. Restricting one or more turning movements, perhaps on a time-of-day basis, if alternate routes are available;</p> <p><del>J.</del> K. If the warrant is satisfied, installing multiway STOP sign control;</p> <p><a href="#">L. Installing a pedestrian hybrid beacon (see Chapter 4F) or In-Roadway Warning Lights (see Chapter 4N) if pedestrian safety is the major concern;</a></p>	<p>E. Installing flashing beacons on warning signs in advance of a STOP sign controlled intersection on major and/or minor-street approaches;</p> <p>F. Adding one or more lanes on a minor-street approach to reduce the number of vehicles per lane on the approach;</p> <p>G. Revising the geometrics at the intersection to channelize vehicular movements and reduce the time required for a vehicle to complete a movement, which could also assist pedestrians;</p> <p>H. Revising the geometrics at the intersection to add pedestrian median refuge islands and/or curb extensions;</p> <p>I. Installing roadway lighting if a disproportionate number of crashes occur at night;</p> <p>J. Restricting one or more turning movements, perhaps on a time-of-day basis, if alternate routes are available;</p> <p>K. If the warrant is satisfied, installing multiway STOP sign control;</p> <p>L. Installing a pedestrian hybrid beacon (see Chapter 4F) or In-Roadway Warning Lights (see Chapter 4N) if pedestrian safety is the major concern;</p> <p>M. Installing a roundabout; and</p> <p>N. Employing other alternatives, depending on conditions at the intersection.</p>	<p>intersection on major and/or minor-street approaches;</p> <p>F. Adding one or more lanes on a minor-street approach to reduce the number of vehicles per lane on the approach;</p> <p>G. Revising the geometrics at the intersection to channelize vehicular movements and reduce the time required for a vehicle to complete a movement, which could also assist pedestrians;</p> <p>H. Revising the geometrics at the intersection to add pedestrian median refuge islands and/or curb extensions;</p> <p>I. Installing roadway lighting if a disproportionate number of crashes occur at night;</p> <p>J. Restricting one or more turning movements, perhaps on a time-of-day basis, if alternate routes are available;</p> <p>K. If the warrant is satisfied, installing multiway STOP sign control;</p> <p>L. Installing a pedestrian hybrid beacon (see Chapter 4F) or <b>other pedestrian safety features</b> if pedestrian safety is the major concern;</p> <p>M. Installing a roundabout; and</p> <p>N. Employing other alternatives, depending on conditions at the intersection.</p>	<p>MN text added</p>
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~~K. M.~~ Installing a roundabout intersection;  
and  
~~L. N.~~ Employing other alternatives,  
depending on conditions at the intersection.

#### 4B.5 Adequate Roadway Capacity

##### SUPPORT:

The delays inherent in the alternating assignment of right-of-way at intersections controlled by traffic control signals can frequently be reduced by widening the major roadway, the minor roadway, or both roadways. Widening the minor roadway often benefits the operations on the major roadway, because it reduces the green time that must be assigned to minor-roadway traffic. In urban areas, the effect of widening can be achieved by eliminating parking on intersection approaches. It is desirable to have at least two lanes for moving traffic on each approach to a signalized location. Additional width on the departure side of the intersection, as well as on the approach side, will sometimes be needed to clear traffic through the intersection effectively.

##### GUIDANCE:

Adequate roadway capacity should be provided at a signalized location. Before an intersection is widened, the additional green time pedestrians need to cross the widened

#### **Section 4B.05 Adequate Roadway Capacity**

##### Support:

<sup>01</sup> The delays inherent in the alternating assignment of right-of-way at intersections controlled by traffic control signals can frequently be reduced by widening the major roadway, the minor roadway, or both roadways. Widening the minor roadway often benefits the operations on the major roadway, because it reduces the green time that must be assigned to minor-roadway traffic. In urban areas, the effect of widening can be achieved by eliminating parking on intersection approaches. It is desirable to have at least two lanes for moving traffic on each approach to a signalized location. Additional width on the departure side of the intersection, as well as on the approach side, will sometimes be needed to clear traffic through the intersection effectively.

##### *Guidance:*

*<sup>02</sup> Adequate roadway capacity should be provided at a signalized location. Before an intersection is widened, the additional green time pedestrians need to cross the widened*

#### 4B.5 Adequate Roadway Capacity

##### SUPPORT:

The delays inherent in the alternating assignment of right-of-way at intersections controlled by traffic control signals can frequently be reduced by widening the major roadway, the minor roadway, or both roadways. Widening the minor roadway often benefits the operations on the major roadway, because it reduces the green time that must be assigned to minor-roadway traffic. In urban areas, the effect of widening can be achieved by eliminating parking on intersection approaches. It is desirable to have at least two lanes for moving traffic on each approach to a signalized location. Additional width on the departure side of the intersection, as well as on the approach side, will sometimes be needed to clear traffic through the intersection effectively.

##### GUIDANCE:

Adequate roadway capacity should be provided at a signalized location. Before an intersection is widened, the additional green time pedestrians need to cross the widened roadways should be considered to determine if

<p>roadways should be considered to determine if it will exceed the green time saved through improved vehicular flow.</p> <p>Other methods of increasing the roadway capacity at signalized locations that do not involve roadway widening, such as revisions to the pavement markings and the careful evaluation of proper lane-use assignments (including varying the lane use by time of day), should be considered where appropriate. Such consideration should include evaluation</p>	<p><i>roadways should be considered to determine if it will exceed the green time saved through improved vehicular flow.</i></p> <p><i>03 Other methods of increasing the roadway capacity at signalized locations that do not involve roadway widening, such as revisions to the pavement markings and the careful evaluation of proper lane-use assignments (including varying the lane use by time of day), should be considered where appropriate. Such consideration should include evaluation</i></p>	<p>it will exceed the green time saved through improved vehicular flow.</p> <p>Other methods of increasing the roadway capacity at signalized locations that do not involve roadway widening, such as revisions to the pavement markings and the careful evaluation of proper lane-use assignments (including varying the lane use by time of day), should be considered where appropriate. Such consideration should include evaluation</p>	<p>Recommend adding this text</p>
<p>4C.1 Studies and Factors for Justifying Traffic Control Signals</p> <p>STANDARD:</p> <p>An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.</p> <p>The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants <del>and other factors related to existing operation and safety at the study location:</del></p> <p>Warrant 1, Eight-Hour Vehicular Volume. Warrant 2, Four-Hour Vehicular Volume. Warrant 3, Peak Hour. Warrant 4, Pedestrian Volume.</p>	<p><b>Section 4C.01 Studies and Factors for Justifying Traffic Control Signals</b></p> <p><b>Standard:</b></p> <p><b>01 An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.</b></p> <p><b>02 The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants:</b></p> <p><b>Warrant 1, Eight-Hour Vehicular Volume</b> <b>Warrant 2, Four-Hour Vehicular Volume</b> <b>Warrant 3, Peak Hour</b> <b>Warrant 4, Pedestrian Volume</b> <b>Warrant 5, School Crossing</b></p>	<p>4C.1 Studies and Factors for Justifying Traffic Control Signals</p> <p>STANDARD:</p> <p>An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.</p> <p>The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants:</p> <p>Warrant 1, Eight-Hour Vehicular Volume. Warrant 2, Four-Hour Vehicular Volume. Warrant 3, Peak Hour. Warrant 4, Pedestrian Volume. Warrant 5, School Crossing. Warrant 6, Coordinated Signal System.</p>	<p>Recommend adding language</p>

<p>Warrant 5, School Crossing. Warrant 6, Coordinated Signal System. Warrant 7, Crash Experience. Warrant 8, Roadway Network. <a href="#">Warrant 9, Intersection Near a Grade Crossing</a></p> <p>The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.</p> <p>SUPPORT:</p> <p>Sections 8D.79 and <del>10D.5</del> 8C.10 contain information regarding the use of traffic control signals instead of gates and/or flashing light signals at highway-rail<del>road</del> grade crossings and highway-light rail transit grade crossings, respectively.</p> <p>GUIDANCE:</p> <p>A traffic control signal should not be installed unless one or more of the factors described in this Chapter are met.</p> <p>A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.</p> <p>A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.</p> <p>The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count</p>	<p><b>Warrant 6, Coordinated Signal System</b> <b>Warrant 7, Crash Experience</b> <b>Warrant 8, Roadway Network</b> <b>Warrant 9, Intersection Near a Grade Crossing</b></p> <p><b>03 The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.</b></p> <p>Support:</p> <p>04 Sections 8C.09 and 8C.10 contain information regarding the use of traffic control signals instead of gates and/or flashing-light signals at highway-rail grade crossings and highway-light rail transit grade crossings, respectively.</p> <p><i>Guidance:</i></p> <p>05 <i>A traffic control signal should not be installed unless one or more of the factors described in this Chapter are met.</i></p> <p>06 <i>A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.</i></p> <p>07 <i>A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.</i></p> <p>08 <i>The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the signal warrants listed in Paragraph 2.</i></p>	<p>Warrant 7, Crash Experience. Warrant 8, Roadway Network. Warrant 9, Intersection Near a Grade Crossing</p> <p>The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.</p> <p>SUPPORT:</p> <p>Sections 8D.9 and 8C.10 contain information regarding the use of traffic control signals instead of gates and/or flashing light signals at highway-rail grade crossings and highway-light rail transit grade crossings, respectively.</p> <p>GUIDANCE:</p> <p>A traffic control signal should not be installed unless one or more of the factors described in this Chapter are met.</p> <p>A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.</p> <p>A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.</p> <p>The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the <b>above</b> signal warrants.</p>	<p>Recommend adding language</p>
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<p>against the <del>above</del>-signal warrants listed in Paragraph 2.</p> <p>Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics <b>should</b> dictate whether an approach <del>should be</del> <b>is</b> considered as one lane or two lanes. For example, for an approach with one lane for through and right-turning traffic plus a left-turn lane, <b>if</b> engineering judgment <del>could</del> <b>indicates</b> that it should be considered a one-lane approach <b>if because</b> the traffic using the left-turn lane is minor. <del>In such a case</del>, the total traffic volume approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles.</p> <p>Similar engineering judgment and rationale should be applied to a street approach with one <b>through/left-turn</b> lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.</p> <p>At a location that is under development or construction and where it is not possible to obtain a traffic count that would represent future traffic conditions, hourly volumes should be estimated as part of an engineering</p>	<p><i>09 Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics should dictate whether an approach is considered as one lane or two lanes. For example, for an approach with one lane for through and right-turning traffic plus a left-turn lane, if engineering judgment indicates that it should be considered a one-lane approach because the traffic using the left-turn lane is minor, the total traffic volume approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles.</i></p> <p><i>10 Similar engineering judgment and rationale should be applied to a street approach with one through/left-turn lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.</i></p> <p><i>11 At a location that is under development or construction and where it is not possible to obtain a traffic count that would represent future traffic conditions, hourly volumes should be estimated as part of an engineering study for comparison with traffic signal warrants. Except for locations where the engineering study uses the satisfaction of Warrant 8 to</i></p>	<p>Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics should dictate whether an approach is considered as one lane or two lanes. For example, for an approach with one lane for through and right-turning traffic plus a left-turn lane, if engineering judgment indicates that it should be considered a one-lane approach because the traffic using the left-turn lane is minor, the total traffic volume approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles.</p> <p>Similar engineering judgment and rationale should be applied to a street approach with one through/left-turn lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.</p> <p>At a location that is under development or construction and where it is not possible to obtain a traffic count that would represent future traffic conditions, hourly volumes should be estimated as part of an engineering study for comparison with traffic signal warrants. Except for locations where the engineering study uses the satisfaction of</p>	<p>MN language to replace paragraph numbers</p>
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<p>study for comparison with traffic signal warrants. Except for locations where the engineering study uses the satisfaction of Warrant 8 to justify a signal, a traffic control signal installed under projected conditions should have an engineering study done within 1 year of putting the signal into stop-and-go operation to determine if the signal is justified. If not justified, the signal should be taken out of stop-and-go operation or removed.</p> <p>For signal warrant analysis, a location with a wide median, even if the median width is greater than 9 m (30 ft), should be considered as one intersection.</p> <p>OPTION:</p> <p>At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the “minor street” volume and the corresponding single direction of opposing traffic on the major street as the “major-street” volume.</p> <p><i>For signal warrants requiring conditions to be present for a certain number of hours in order to be satisfied, any four sequential 15-minute periods may be considered as 1 hour if the separate 1-hour periods used in the warrant analysis do not overlap each other and both the major-street volume and the minor-street volume are for the same specific one-hour periods.</i></p> <p>For signal warrant analysis, bicyclists may be counted as either vehicles or pedestrians.</p> <p>SUPPORT</p>	<p><i>justify a signal, a traffic control signal installed under projected conditions should have an engineering study done within 1 year of putting the signal into stop-and-go operation to determine if the signal is justified. If not justified, the signal should be taken out of stop-and-go operation or removed.</i></p> <p><i>12 For signal warrant analysis, a location with a wide median, even if the median width is greater than 30 feet, should be considered as one intersection.</i></p> <p>Option:</p> <p>13 At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the “minor-street” volume and the corresponding single direction of opposing traffic on the major street as the “major-street” volume.</p> <p>14 For signal warrants requiring conditions to be present for a certain number of hours in order to be satisfied, any four sequential 15-minute periods may be considered as 1 hour if the separate 1-hour periods used in the warrant analysis do not overlap each other and both the major-street volume and the minor-street volume are for the same specific one-hour periods.</p> <p>15 For signal warrant analysis, bicyclists may be counted as either vehicles or pedestrians.</p>	<p>Warrant 8 to justify a signal, a traffic control signal installed under projected conditions should have an engineering study done within 1 year of putting the signal into stop-and-go operation to determine if the signal is justified. If not justified, the signal should be taken out of stop-and-go operation or removed.</p> <p>For signal warrant analysis, a location with a wide median, even if the median width is greater than 9 m (30 ft), should be considered as one intersection.</p> <p>OPTION:</p> <p>At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the “minor street” volume and the corresponding single direction of opposing traffic on the major street as the “major-street” volume.</p> <p>For signal warrants requiring conditions to be present for a certain number of hours in order to be satisfied, any four sequential 15-minute periods may be considered as 1 hour if the separate 1-hour periods used in the warrant analysis do not overlap each other and both the major-street volume and the minor-street volume are for the same specific one-hour periods.</p> <p>For signal warrant analysis, bicyclists may be counted as either vehicles or pedestrians.</p> <p>SUPPORT</p>	<p>Recommend adding language</p>
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<p>When performing a signal warrant analysis, bicyclists riding in the street with other vehicular traffic are usually counted as vehicles and bicyclists who are clearly using pedestrian facilities are usually counted as pedestrians.</p> <p>OPTION</p> <p>Engineering study data may include the following:</p> <p>A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.</p> <p>B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is greatest.</p> <p>C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Item B <b>above</b> and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.</p> <p>D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons might not be adequately reflected in the pedestrian</p>	<p>Support:</p> <p>16 When performing a signal warrant analysis, bicyclists riding in the street with other vehicular traffic are usually counted as vehicles and bicyclists who are clearly using pedestrian facilities are usually counted as pedestrians.</p> <p>Option:</p> <p>17 Engineering study data may include the following:</p> <p>A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.</p> <p>B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is greatest.</p> <p>C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Item B and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.</p> <p>D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons might not be adequately reflected in the pedestrian</p>	<p>When performing a signal warrant analysis, bicyclists riding in the street with other vehicular traffic are usually counted as vehicles and bicyclists who are clearly using pedestrian facilities are usually counted as pedestrians.</p> <p>OPTION</p> <p>Engineering study data may include the following:</p> <p>A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.</p> <p>B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is greatest.</p> <p>C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Item B and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.</p> <p>D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons might not be adequately reflected in the pedestrian</p>	
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<p>volume count if the absence of a signal restrains their mobility.</p> <p>E. The posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the uncontrolled approaches to the location.</p> <p>F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.</p> <p>G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.</p> <p>The following data, which are desirable for a more precise understanding of the operation of the intersection, may be obtained during the periods <b>specified described</b> in Item B of the <b>preceding paragraph Paragraph 17</b>:</p> <p>A. Vehicle-hours of stopped time delay determined separately for each approach.</p> <p>B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance from the minor street.</p> <p>C. The posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on controlled approaches at a point near to the intersection but unaffected by the control.</p> <p>D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or Sunday.</p>	<p>volume count if the absence of a signal restrains their mobility.</p> <p>E. The posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the uncontrolled approaches to the location.</p> <p>F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.</p> <p>G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.</p> <p>18 The following data, which are desirable for a more precise understanding of the operation of the intersection, may be obtained during the periods described in Item B of Paragraph 17:</p> <p>A. Vehicle-hours of stopped time delay determined separately for each approach.</p> <p>B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance from the minor street.</p> <p>C. The posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on controlled approaches at a point near to the intersection but unaffected by the control.</p> <p>D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or Sunday.</p> <p>E. Queue length on stop-controlled approaches.</p>	<p>volume count if the absence of a signal restrains their mobility.</p> <p>E. The posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the uncontrolled approaches to the location.</p> <p>F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.</p> <p>G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.</p> <p>The following data, which are desirable for a more precise understanding of the operation of the intersection, may be obtained during the periods described in Item B of the <b>preceding paragraph</b>:</p> <p>A. Vehicle-hours of stopped time delay determined separately for each approach.</p> <p>B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance from the minor street.</p> <p>C. The posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on controlled approaches at a point near to the intersection but unaffected by the control.</p> <p>D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or Sunday.</p>	
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<p>E. Queue length on stop-controlled approaches.</p> <p>4C.2 Warrant 1, Eight-Hour Vehicular Volume</p> <p>SUPPORT:</p> <p>The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.</p> <p>The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.</p> <p>It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then <del>the criteria for</del> Warrant 1 is satisfied and <b>analysis of</b> Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then <del>the criteria for</del> Warrant 1 is satisfied and <b>an analysis of</b> the combination of Conditions A and B is not needed.</p> <p>STANDARD</p> <p>The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:</p> <p>A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively,</p>	<p><b>Section 4C.02 Warrant 1, Eight-Hour Vehicular Volume</b></p> <p>Support:</p> <p>01 The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.</p> <p>02 The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.</p> <p>03 It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.</p> <p><b>Standard:</b></p> <p>04 <b>The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:</b></p> <p><b>A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or</b></p> <p><b>B. The vehicles per hour given in both of the</b></p>	<p>E. Queue length on stop-controlled approaches.</p> <p>4C.2 Warrant 1, Eight-Hour Vehicular Volume</p> <p>SUPPORT:</p> <p>The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.</p> <p>The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.</p> <p>It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analysis of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and an analysis of the combination of Conditions A and B is not needed.</p> <p>STANDARD</p> <p>The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:</p> <p>A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or</p>	<p>Recommend adopting language change. Also changes to notes on table 4C-1</p> <p>Figures moved to 4C.6</p>
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<p>to the intersection; or</p> <p>B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.</p> <p>In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.</p> <p><b>OPTION</b></p> <p>If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.</p> <p><b>GUIDANCE</b></p> <p>The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.</p> <p><b>STANDARD</b></p> <p>The need for a traffic control signal shall be considered if an engineering study finds that both of the following conditions exist for each</p>	<p><b>100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection. In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.</b></p> <p><b>Option:</b></p> <p>05 If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.</p> <p><i>Guidance:</i></p> <p>06 <i>The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.</i></p> <p><b>Standard:</b></p> <p>07 <b>The need for a traffic control signal shall be considered if an engineering study finds that both of the following conditions exist for each of any 8 hours of an average day: A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and</b></p>	<p>B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.</p> <p>In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.</p> <p><b>OPTION</b></p> <p>If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.</p> <p><b>GUIDANCE</b></p> <p>The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.</p> <p><b>STANDARD</b></p> <p>The need for a traffic control signal shall be considered if an engineering study finds that both of the following conditions exist for each of any 8 hours of an average day:</p>	
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<p>of any 8 hours of an average day:</p> <p>A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and</p> <p>B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.</p> <p>These major street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street the higher volume shall not be required to be on the same approach during each of the 8 hours.</p> <p>4C.3 Warrant 2, Four-Hour Vehicular Volume</p> <p>SUPPORT:</p> <p>The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.</p> <p>STANDARD</p> <p>The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per</p>	<p><b>B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection. These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.</b></p> <p>Option: 08 If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.</p> <p><b>Section 4C.03 Warrant 2, Four-Hour Vehicular Volume</b></p> <p>Support: 01 The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.</p> <p><b>Standard:</b> 02 <b>The need for a traffic control signal shall be considered if an engineering study finds</b></p>	<p>A. The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and</p> <p>B. The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.</p> <p>These major street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street the higher volume shall not be required to be on the same approach during each of the 8 hours.</p> <p>4C.3 Warrant 2, Four-Hour Vehicular Volume</p> <p>SUPPORT:</p> <p>The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.</p> <p>STANDARD</p> <p>The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per</p>	<p>No change</p>
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<p>hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.</p> <p>OPTION</p> <p>If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.</p> <p>4C.4 Warrant 3, Peak Hour</p> <p>SUPPORT</p> <p>The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.</p> <p>STANDARD</p> <p>This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.</p> <p>The need for a traffic control signal shall be</p>	<p><b>that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.</b></p> <p>Option:</p> <p>03 If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.</p> <p><b>Section 4C.04 Warrant 3, Peak Hour Support:</b></p> <p>01 The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.</p> <p><b>Standard:</b></p> <p>02 <b>This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.</b></p>	<p>hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.</p> <p>OPTION</p> <p>If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.</p> <p>4C.4 Warrant 3, Peak Hour</p> <p>SUPPORT</p> <p>The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.</p> <p>STANDARD</p> <p>This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.</p>	
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<p>considered if an engineering study finds that the criteria in either of the following two categories are met:</p> <p>A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:</p> <ol style="list-style-type: none"> <li>1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and</li> <li>2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and</li> <li>3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.</li> </ol> <p>B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.</p> <p>OPTION</p> <p>If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less</p>	<p><b>03 The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:</b></p> <p><b>A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:</b></p> <ol style="list-style-type: none"> <li><b>1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach; and</b></li> <li><b>2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and</b></li> <li><b>3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.</b></li> </ol> <p><b>B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.</b></p> <p>Option:</p> <p>04 If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated</p>	<p>The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:</p> <p>A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:</p> <ol style="list-style-type: none"> <li>1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and</li> <li>2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and</li> <li>3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.</li> </ol> <p>B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.</p> <p>OPTION</p> <p>If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an</p>	
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<p>than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to <del>satisfy</del> evaluate the criteria in the second category of the Standard.</p> <p>If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal may be operated in the flashing mode during the hours that the volume criteria of this warrant are not met.</p> <p><b>Guidance:</b> If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal should be traffic-actuated.</p> <p>4C.5 Warrant 4, Pedestrian Volume</p> <p><b>SUPPORT</b></p> <p>The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.</p> <p><b>STANDARD</b></p> <p>The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that <del>both</del> one of the following criteria <del>are</del> is met:</p> <p><del>A. The pedestrian volume crossing the major street at an intersection or mid-block location during an average day is 100 or more for each</del></p>	<p>community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to evaluate the criteria in the second category of the Standard.</p> <p>05 If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal may be operated in the flashing mode during the hours that the volume criteria of this warrant are not met.</p> <p><b>Guidance:</b> 06 If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal should be traffic-actuated.</p> <p><b>Section 4C.05 Warrant 4, Pedestrian Volume</b></p> <p><b>Support:</b> 01 The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.</p> <p><b>Standard:</b> 02 <b>The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that one of the following criteria is met:</b> <b>A. For each of any 4 hours of an average day, the plotted points representing the</b></p>	<p>isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to evaluate the criteria in the second category of the Standard.</p> <p>If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal may be operated in the flashing mode during the hours that the volume criteria of this warrant are not met.</p> <p><b>Guidance:</b> If this warrant is the only warrant met and a traffic control signal is justified by an engineering study, the traffic control signal should be traffic-actuated.</p> <p>4C.5 Warrant 4, Pedestrian Volume</p> <p><b>SUPPORT</b></p> <p>The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.</p> <p><b>STANDARD</b></p> <p>The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that one of the following criteria is met:</p> <p>A. For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all</p>	<p>Recommend adding language</p>
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<p><b>Standard:</b></p> <p>The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal <del>along</del> or STOP sign controlling the <del>major</del> street that pedestrians desire to cross is less than 90 m (300 ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.</p> <p>If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads <del>conforming to requirements</del> complying with the provisions set forth in Chapter 4E.</p> <p><b>GUIDANCE</b></p> <p>If this warrant is met and a traffic control signal is justified by an engineering study, then:</p> <p>A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated and should include pedestrian <del>detectors</del> detection.</p> <p>B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP and YIELD signs, and should be pedestrian-actuated; If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 30 m (100 ft) in advance of and at least 6.1 m (20 ft) beyond the crosswalk or site</p>	<p><b>Standard:</b></p> <p><b>04 The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.</b></p> <p><b>05 If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4E.</b></p> <p><i>Guidance:</i></p> <p><i>06 If this warrant is met and a traffic control signal is justified by an engineering study, then:</i></p> <p><i>A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated, and should include pedestrian detection.</i></p> <p><i>B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk or site accommodations should be made through curb</i></p>	<p><b>Standard:</b></p> <p>The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross is less than 90 m (300 ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.</p> <p>If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4E.</p> <p><b>GUIDANCE</b></p> <p>If this warrant is met and a traffic control signal is justified by an engineering study, then:</p> <p>A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated and should include pedestrian detection.</p> <p>B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP and YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 30 m (100 ft) in advance of and at least 6.1 m (20 ft) beyond the crosswalk or site</p>	<p>Recommend changing text</p>
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<p>accommodations should be made through curb extensions or other techniques to provide adequate site distance, and the installation should include suitable standard signs and pavement markings.</p> <p>C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.</p> <p><b>OPTION</b></p> <p>The criterion for the pedestrian volume crossing the major roadway street may be reduced as much as 50 percent if the average 15<sup>th</sup>-percentile crossing speed of pedestrians is less than 1.2 m/sec (4 ft/sec) 3.5 ft/sec.</p> <p>A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street, even if the rate of gap occurrence is less than one per minute.</p> <p>4C.6 Warrant 5, School Crossing</p> <p><b>SUPPORT</b></p> <p>The School Crossing signal warrant is intended for application where the fact that school children cross the major street is the principal reason to consider installing a traffic control signal. For the purposes of this warrant, the word “schoolchildren” includes elementary through high school students.</p>	<p><i>extensions or other techniques to provide adequate sight distance, and the installation should include suitable standard signs and pavement markings.</i></p> <p><i>C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.</i></p> <p><b>Option:</b></p> <p>07 The criterion for the pedestrian volume crossing the major street may be reduced as much as 50 percent if the 15th-percentile crossing speed of pedestrians is less than 3.5 feet per second.</p> <p>08 A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street.</p> <p><b>Section 4C.06 Warrant 5, School Crossing</b></p> <p><b>Support:</b></p> <p>01 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” includes elementary through high school students.</p>	<p>accommodations should be made through curb extensions or other techniques to provide adequate site distance, and the installation should include suitable standard signs and pavement markings.</p> <p>C. Furthermore, if it is installed within a series of signals, the traffic control signal should be coordinated.</p> <p><b>OPTION</b></p> <p>The criterion for the pedestrian volume crossing the major street may be reduced as much as 50 percent if the 15<sup>th</sup>-percentile crossing speed of pedestrians is less than 3.5 ft/sec.</p> <p>A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street.</p> <p>4C.6 Warrant 5, School Crossing</p> <p><b>SUPPORT</b></p> <p>The School Crossing signal warrant is intended for application where the fact that school children cross the major street is the principal reason to consider installing a traffic control signal. For the purposes of this warrant, the word “schoolchildren” includes elementary through high school students.</p>	<p>Recommend changing text with slight MN modification in C</p> <p>Considered removing this paragraph. Recommend changing text if keeping</p> <p>Recommend updating text</p> <p>Figures moved here from section 4C.2</p> <p>Recommend updating text</p>
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<p><b>STANDARD</b></p> <p>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 school children 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.3) and there are a minimum of 20 <del>students-</del> schoolchildren during the highest crossing hour.</p> <p>Before a decision is made to install a traffic control signal, consideration shall be given to the implementation of other remedial measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.</p> <p>The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90 m (300 ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.</p> <p><b>GUIDANCE</b></p> <p>If this warrant is met and a traffic control signal is justified by an engineering study, then:</p> <p>A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated and should include pedestrian <del>detectors</del> detection.</p>	<p><b>Standard:</b></p> <p><b>02 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 schoolchildren during the highest crossing hour.</b></p> <p><b>03 Before a decision is made to install a traffic control signal, consideration shall be given to the implementation of other remedial measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.</b></p> <p><b>04 The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.</b></p> <p><i>Guidance:</i></p> <p><i>05 If this warrant is met and a traffic control signal is justified by an engineering study, then:</i></p> <p><i>A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated, and should include pedestrian detection.</i></p> <p><i>B. If it is installed at a non-intersection</i></p>	<p><b>STANDARD</b></p> <p>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 school children 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.3) and there are a minimum of 20 <del>students-</del> schoolchildren during the highest crossing hour.</p> <p>Before a decision is made to install a traffic control signal, consideration shall be given to the implementation of other remedial measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.</p> <p>The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90 m (300 ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.</p> <p><b>GUIDANCE</b></p> <p>If this warrant is met and a traffic control signal is justified by an engineering study, then:</p> <p>A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated and should include pedestrian detection.</p>	
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<p>B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 30 m (100 ft) in advance of and at least 6.1 m (20 ft) beyond the crosswalk or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance, and the installation should include suitable standard signs and pavement markings.</p> <p>C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.</p> <p>Section 4C.7 Warrant 6, Coordinated Signal System</p> <p>SUPPORT</p> <p>Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.</p> <p>STANDARD</p> <p>The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:</p> <p>A. On a one-way street or a street that has</p>	<p><i>crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance, and the installation should include suitable standard signs and pavement markings.</i></p> <p><i>C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.</i></p> <p><b>Section 4C.07 Warrant 6, Coordinated Signal System</b></p> <p>Support:</p> <p>01 Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.</p> <p>Standard:</p> <p>02 <b>The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:</b></p> <p><b>A. On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary</b></p>	<p>B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 30 m (100 ft) in advance of and at least 6.1 m (20 ft) beyond the crosswalk or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance, and the installation should include suitable standard signs and pavement markings.</p> <p>C. Furthermore, if it is installed within a series of signals, the traffic control signal should be coordinated.</p> <p>4C.7 Warrant 6, Coordinated Signal System</p> <p>SUPPORT</p> <p>Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.</p> <p>STANDARD</p> <p>The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:</p> <p>A. On a one-way street or a street that has traffic predominantly in one direction, the</p>	<p>Recommend adding Mn text</p>
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<p>traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.</p> <p>B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.</p> <p><b>GUIDANCE</b></p> <p>The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 300 m (1,000 ft).</p> <p><b>4C.8 Warrant 7, Crash Experience</b></p> <p><b>SUPPORT</b></p> <p>The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.</p> <p><b>STANDARD</b></p> <p>The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:</p> <p>A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and</p> <p>B. Five or more reported crashes, of types susceptible to correction by a traffic control</p>	<p><b>degree of vehicular platooning.</b></p> <p><b>B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.</b></p> <p><i>Guidance:</i></p> <p><i>03 The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 1,000 feet.</i></p> <p><b>Section 4C.08 Warrant 7, Crash Experience</b></p> <p><b>Support:</b></p> <p><i>01 The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.</i></p> <p><b>Standard:</b></p> <p><i>02 The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:</i></p> <p><b>A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and</b></p> <p><b>B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have</b></p>	<p>adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.</p> <p>B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.</p> <p><b>GUIDANCE</b></p> <p>The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 300 m (1,000 ft).</p> <p><b>4C.8 Warrant 7, Crash Experience</b></p> <p><b>SUPPORT</b></p> <p>The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.</p> <p><b>STANDARD</b></p> <p>The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:</p> <p>A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and</p> <p>B. Five or more reported crashes, of types susceptible to correction by a traffic control</p>	<p>No Change</p>
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<p>signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and</p> <p>C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.2), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.</p> <p><b>OPTION</b></p> <p>If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.</p> <p>4C.9 Warrant 8, Roadway Network</p> <p><b>SUPPORT</b></p> <p>Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.</p>	<p><b>occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.</b></p> <p>Option:</p> <p>03 If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.</p> <p><b>Section 4C.09 Warrant 8, Roadway Network</b></p> <p>Support:</p> <p>01 Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.</p> <p><b>Standard:</b></p>	<p>signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and</p> <p>C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.2), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.</p> <p><b>OPTION</b></p> <p>If the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.</p> <p>4C.9 Warrant 8, Roadway Network</p> <p><b>SUPPORT</b></p> <p>Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.</p>	<p>No change</p>
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<p>STANDARD</p> <p>The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:</p> <p>A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or</p> <p>B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).</p> <p>A major route as used in this signal warrant shall have <b>at least one or more</b> of the following characteristics:</p> <p>A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow;<del>or</del></p> <p>B. It includes rural or suburban highways outside, entering, or traversing a City;<del>or</del></p> <p>C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.</p> <p><b>Section 4C.10 Warrant 9, Intersection Near a Grade Crossing</b></p> <p>Support:</p> <p><b>01 The Intersection Near a Grade Crossing signal warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but</b></p>	<p><b>02 The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:</b></p> <p><b>A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or</b></p> <p><b>B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).</b></p> <p><b>03 A major route as used in this signal warrant shall have at least one of the following characteristics:</b></p> <p><b>A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow.</b></p> <p><b>B. It includes rural or suburban highways outside, entering, or traversing a city.</b></p> <p><b>C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.</b></p> <p><b>Section 4C.10 Warrant 9, Intersection Near a Grade Crossing</b></p> <p>Support:</p> <p>01 The Intersection Near a Grade Crossing signal warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade</p>	<p>STANDARD</p> <p>The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:</p> <p>A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or</p> <p>B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).</p> <p>A major route as used in this signal warrant shall have at least one of the following characteristics:</p> <p>A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow.</p> <p>B. It includes rural or suburban highways outside, entering, or traversing a City.</p> <p>C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.</p> <p><b>Section 4C.10 Warrant 9, Intersection Near a Grade Crossing</b></p> <p>Support:</p> <p>01 The Intersection Near a Grade Crossing signal warrant is intended for use at a location where none of the conditions described in the</p>	<p>Recommend updating text</p> <p>New Fed. Language recommend adding text</p>
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<p>the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.</p> <p>Guidance:</p> <p>02 This signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing. Among the alternatives that should be considered or tried are:</p> <p>A. Providing additional pavement that would enable vehicles to clear the track or that would provide space for an evasive maneuver, or</p> <p>B. Reassigning the stop controls at the intersection to make the approach across the track a non-stopping approach.</p> <p>Standard:</p> <p>03 The need for a traffic control signal shall be considered if an engineering study finds that both of the following criteria are met:</p> <p>A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and</p> <p>B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in Figure 4C-9 or 4C-10 for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance as defined in Section 1A.13.</p>	<p>crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.</p> <p>Guidance:</p> <p>02 <i>This signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing. Among the alternatives that should be considered or tried are:</i></p> <p>A. <i>Providing additional pavement that would enable vehicles to clear the track or that would provide space for an evasive maneuver, or</i></p> <p>B. <i>Reassigning the stop controls at the intersection to make the approach across the track a non-stopping approach.</i></p> <p><b>Standard:</b></p> <p>03 <b>The need for a traffic control signal shall be considered if an engineering study finds that both of the following criteria are met:</b></p> <p><b>A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and</b></p> <p><b>B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in Figure 4C-9 or 4C-10 for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance as defined in Section 1A.13.</b></p>	<p>other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.</p> <p>Guidance:</p> <p>02 This signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing. Among the alternatives that should be considered or tried are:</p> <p>A. Providing additional pavement that would enable vehicles to clear the track or that would provide space for an evasive maneuver, or</p> <p>B. Reassigning the stop controls at the intersection to make the approach across the track a non-stopping approach.</p> <p>Standard:</p> <p>03 The need for a traffic control signal shall be considered if an engineering study finds that both of the following criteria are met:</p> <p>A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and</p> <p>B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in Figure 4C-9 or 4C-10 for the existing combination of approach lanes over the track and the distance D, which is the clear storage</p>	
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<p><b>Guidance:</b> The following considerations apply when plotting the traffic volume data on Figure 4C-9 or 4C-10:</p> <p>A. Figure 4C-9 should be used if there is only one lane approaching the intersection at the track crossing location and Figure 4C-10 should be used if there are two or more lanes approaching the intersection at the track crossing location.</p> <p>B. After determining the actual distance D, the curve for the distance D that is nearest to the actual distance D should be used. For example, if the actual distance D is 95 feet, the plotted point should be compared to the curve for D = 90 feet.</p> <p>C. If the rail traffic arrival times are unknown, the highest traffic volume hour of the day should be used.</p> <p><b>Option:</b> The minor-street approach volume may be multiplied by up to three adjustment factors as provided in Paragraphs 6 through 8.</p> <p>06 Because the curves are based on an average of four occurrences of rail traffic per day, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-2 for the appropriate number of occurrences of rail traffic per day.</p> <p>Because the curves are based on typical vehicle occupancy, if at least 2% of the vehicles crossing the track are buses carrying at least 20 people, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-3 for the appropriate percentage of high-occupancy buses.</p> <p>Because the curves are based on tractor-trailer trucks comprising 10% of the vehicles crossing the track, the vehicles per hour on the minor-</p>	<p><b>Guidance:</b> 04 <i>The following considerations apply when plotting the traffic volume data on Figure 4C-9 or 4C-10:</i></p> <p><i>A. Figure 4C-9 should be used if there is only one lane approaching the intersection at the track crossing location and Figure 4C-10 should be used if there are two or more lanes approaching the intersection at the track crossing location.</i></p> <p><i>B. After determining the actual distance D, the curve for the distance D that is nearest to the actual distance D should be used. For example, if the actual distance D is 95 feet, the plotted point should be compared to the curve for D = 90 feet.</i></p> <p><i>C. If the rail traffic arrival times are unknown, the highest traffic volume hour of the day should be used.</i></p> <p><b>Option:</b> 05 The minor-street approach volume may be multiplied by up to three adjustment factors as provided in Paragraphs 6 through 8.</p> <p>06 Because the curves are based on an average of four occurrences of rail traffic per day, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-2 for the appropriate number of occurrences of rail traffic per day.</p> <p>07 Because the curves are based on typical vehicle occupancy, if at least 2% of the vehicles crossing the track are buses carrying at least 20 people, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-3 for the appropriate percentage of high-occupancy buses.</p> <p>08 Because the curves are based on tractor-trailer trucks comprising 10% of the vehicles crossing the track, the vehicles per hour on the</p>	<p>distance as defined in Section 1A.13.</p> <p><b>Guidance:</b> 0The following considerations apply when plotting the traffic volume data on Figure 4C-9 or 4C-10:</p> <p>A. Figure 4C-9 should be used if there is only one lane approaching the intersection at the track crossing location and Figure 4C-10 should be used if there are two or more lanes approaching the intersection at the track crossing location.</p> <p>B. After determining the actual distance D, the curve for the distance D that is nearest to the actual distance D should be used. For example, if the actual distance D is 95 feet, the plotted point should be compared to the curve for D = 90 feet.</p> <p>C. If the rail traffic arrival times are unknown, the highest traffic volume hour of the day should be used.</p> <p><b>Option:</b> The minor-street approach volume may be multiplied by up to three adjustment factors as provided in Paragraphs 6 through 8.</p> <p>06 Because the curves are based on an average of four occurrences of rail traffic per day, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-2 for the appropriate number of occurrences of rail traffic per day.</p> <p>Because the curves are based on typical vehicle occupancy, if at least 2% of the vehicles crossing the track are buses carrying at least 20 people, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-3 for the appropriate percentage of high-occupancy buses.</p> <p>Because the curves are based on tractor-trailer trucks comprising 10% of the vehicles crossing</p>	
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<p>street approach may be multiplied by the adjustment factor shown in Table 4C-4 for the appropriate distance and percentage of tractor-trailer trucks.</p> <p>Standard: If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, then: A. The traffic control signal shall have actuation on the minor street; B. Preemption control shall be provided in accordance with Sections 4D.27, 8C.09, and 8C.10; and C. The grade crossing shall have flashing-light signals (see Chapter 8C).</p> <p>Guidance: If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, the grade crossing should have automatic gates (see Chapter 8C).</p> <p>Section 4D.1 General</p> <p>SUPPORT The features of traffic control signals of interest to road users are the location, design, and meaning of the signal indications. Uniformity in the design features that affect the traffic to be controlled, as set forth in this Manual, is especially important for <del>reasonably safe and efficient traffic</del> the safety and efficiency of operations.</p> <p>Traffic control signals can be operated in pretimed, semi-actuated, or full-actuated modes. For isolated (non-interconnected) signalized locations on rural high-speed highways, full-actuated mode with advance vehicle detection on the high-speed approaches</p>	<p>minor-street approach may be multiplied by the adjustment factor shown in Table 4C-4 for the appropriate distance and percentage of tractor-trailer trucks.</p> <p>Standard: <b>09 If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, then:</b> <b>A. The traffic control signal shall have actuation on the minor street;</b> <b>B. Preemption control shall be provided in accordance with Sections 4D.27, 8C.09, and 8C.10; and</b> <b>C. The grade crossing shall have flashing-light signals (see Chapter 8C).</b></p> <p>Guidance: <i>10 If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, the grade crossing should have automatic gates (see Chapter 8C).</i></p> <p>Section 4D.01 General</p> <p>Support: 01 The features of traffic control signals of interest to road users are the location, design, and meaning of the signal indications. Uniformity in the design features that affect the traffic to be controlled, as set forth in this Manual, is especially important for the safety and efficiency of operations.</p> <p>02 Traffic control signals can be operated in pretimed, semi-actuated, or full-actuated modes. For isolated (non-interconnected) signalized locations on rural high-speed highways, full-actuated mode with advance vehicle detection on the high-speed approaches</p>	<p>the track, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in Table 4C-4 for the appropriate distance and percentage of tractor-trailer trucks.</p> <p>Standard: If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, then: A. The traffic control signal shall have actuation on the minor street; B. Preemption control shall be provided in accordance with Sections 4D.27, 8C.09, and 8C.10; and C. The grade crossing shall have flashing-light signals (see Chapter 8C).</p> <p>Guidance: If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, the grade crossing should have automatic gates (see Chapter 8C).</p> <p>Section 4D.1 General</p> <p>SUPPORT The features of traffic control signals of interest to road users are the location, design, and meaning of the signal indications. Uniformity in the design features that affect the traffic to be controlled, as set forth in this Manual, is especially important for the safety and efficiency of operations.</p> <p>Traffic control signals can be operated in pretimed, semi-actuated, or full-actuated modes. For isolated (non-interconnected) signalized locations on rural high-speed highways, full-actuated mode with advance vehicle detection on the high-speed approaches is typically used. These features are designed</p>	<p>THE SECTIONS IN THIS CHAPTER AND THE TEXT WITHIN THE SECTIONS HAS BEEN SUBSTANTIALLY REORGANIZED.</p> <p>3 paragraphs relocated to 4D.34 and 4D.35</p>
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<p>is typically used. These features are designed to reduce the frequency with which the onset of the yellow change interval is displayed when high-speed approaching vehicles are in the “dilemma zone” such that the drivers of these high-speed vehicles find it difficult to decide whether to stop or proceed.</p> <p><b>STANDARD</b> When a traffic control signal is not in operation, such as before it is placed in service, during seasonal shutdowns, or when it is not desirable to operate the traffic control signal, the signal faces shall be covered, turned, or taken down to clearly indicate that the traffic control signal is not in operation.</p> <p><b>Support:</b> Seasonal shutdown is a condition in which a permanent traffic signal is turned off or otherwise made non-operational during a particular season when its operation is not justified. This might be applied in a community where tourist traffic during most of the year justifies the permanent signalization, but a seasonal shutdown of the signal during an annual period of lower tourist traffic would reduce delays; or where a major traffic generator, such as a large factory, justifies the permanent signalization, but the large factory is shut down for an annual factory vacation for a few weeks in the summer.</p> <p><b>Standard:</b> A traffic control signal shall control traffic only at the intersection or midblock location where the signal faces are placed.</p> <p>Midblock crosswalks shall not be signalized if they are located within 90 m (300 ft) from the</p>	<p>is typically used. These features are designed to reduce the frequency with which the onset of the yellow change interval is displayed when high-speed approaching vehicles are in the “dilemma zone” such that the drivers of these high-speed vehicles find it difficult to decide whether to stop or proceed.</p> <p><b>Standard:</b> <b>03 When a traffic control signal is not in operation, such as before it is placed in service, during seasonal shutdowns, or when it is not desirable to operate the traffic control signal, the signal faces shall be covered, turned, or taken down to clearly indicate that the traffic control signal is not in operation.</b></p> <p><b>Support:</b> 04 Seasonal shutdown is a condition in which a permanent traffic signal is turned off or otherwise made non-operational during a particular season when its operation is not justified. This might be applied in a community where tourist traffic during most of the year justifies the permanent signalization, but a seasonal shutdown of the signal during an annual period of lower tourist traffic would reduce delays; or where a major traffic generator, such as a large factory, justifies the permanent signalization, but the large factory is shut down for an annual factory vacation for a few weeks in the summer.</p> <p><b>Standard:</b> <b>05 A traffic control signal shall control traffic only at the intersection or midblock location where the signal faces are placed.</b></p> <p><b>06 Midblock crosswalks shall not be signalized if they are located within 300 feet</b></p>	<p>to reduce the frequency with which the onset of the yellow change interval is displayed when high-speed approaching vehicles are in the “dilemma zone” such that the drivers of these high-speed vehicles find it difficult to decide whether to stop or proceed.</p> <p><b>STANDARD</b> When a traffic control signal is not in operation, such as before it is placed in service, during seasonal shutdowns, or when it is not desirable to operate the traffic control signal, the signal faces shall be covered, turned, or taken down to clearly indicate that the traffic control signal is not in operation.</p> <p><b>Support:</b> Seasonal shutdown is a condition in which a permanent traffic signal is turned off or otherwise made non-operational during a particular season when its operation is not justified. This might be applied in a community where tourist traffic during most of the year justifies the permanent signalization, but a seasonal shutdown of the signal during an annual period of lower tourist traffic would reduce delays; or where a major traffic generator, such as a large factory, justifies the permanent signalization, but the large factory is shut down for an annual factory vacation for a few weeks in the summer.</p> <p><b>Standard:</b> A traffic control signal shall control traffic only at the intersection or midblock location where the signal faces are placed.</p> <p>Midblock crosswalks shall not be signalized if they are located within 90 m (300 ft) from the</p>	<p>Some paragraphs relocated from 4D.14</p> <p>Recommend changing per Fed manual</p>
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<p>nearest traffic control signal, unless the proposed traffic control signal will not restrict the progressive movement of traffic.</p> <p><b>GUIDANCE</b>  A <del>M</del>midblock crosswalks location should not be <del>signalized</del> controlled by a traffic control signal if <del>they are</del> the crosswalk is located within 30 m (100 ft) from side streets or driveways that are controlled by STOP signs or YIELD signs.  COMPLIANCE DATE: DECEMBER 22, 2013</p> <p>Engineering judgment should be used to determine the proper phasing and timing for a traffic control signal. Since traffic flows and patterns change, phasing and timing should be reevaluated regularly and updated if needed.</p> <p>Traffic control signals within 1/2 mile of one another along a major route or in a network of intersecting major routes should be coordinated, preferably with interconnected controller units. <b>Where traffic control signals that are within 1/2 mile of one another along a major route have a jurisdictional boundary or a boundary between different signal systems between them, coordination across the boundary should be considered.</b>  Support:  <del>However,</del> Signal coordination need not be maintained <del>across boundaries between signal systems</del> between control sections that operate on different cycle lengths.</p> <p>For coordination with <del>railroad-highway</del> grade crossing signals and movable bridge signals,</p>	<p><b>from the nearest traffic control signal, unless the proposed traffic control signal will not restrict the progressive movement of traffic.</b>  <i>Guidance:</i>  07 <i>A midblock crosswalk location should not be controlled by a traffic control signal if the crosswalk is located within 100 feet from side streets or driveways that are controlled by STOP signs or YIELD signs.</i></p> <p>08 <i>Engineering judgment should be used to determine the proper phasing and timing for a traffic control signal. Since traffic flows and patterns change, phasing and timing should be reevaluated regularly and updated if needed.</i>  09 <i>Traffic control signals within 1/2 mile of one another along a major route or in a network of intersecting major routes should be coordinated, preferably with interconnected controller units. Where traffic control signals that are within 1/2 mile of one another along a major route have a jurisdictional boundary or a boundary between different signal systems between them, coordination across the boundary should be considered.</i>  Support:  10 Signal coordination need not be maintained between control sections that operate on different cycle lengths.  11 For coordination with grade crossing signals and movable bridge signals, see Sections 4D.27, 4J.03, 8C.09, and 8C.10.</p>	<p>nearest traffic control signal, unless the proposed traffic control signal will not restrict the progressive movement of traffic.</p> <p><b>GUIDANCE</b>  A midblock crosswalk location should not be controlled by a traffic control signal if the crosswalk is located within 30 m (100 ft) from side streets or driveways that are controlled by STOP signs or YIELD signs.  <b>COMPLIANCE DATE: DECEMBER 22, 2013</b></p> <p>Engineering judgment should be used to determine the proper phasing and timing for a traffic control signal. Since traffic flows and patterns change, phasing and timing should be reevaluated regularly and updated if needed.</p> <p>Traffic control signals within 1/2 mile of one another along a major route or in a network of intersecting major routes should be coordinated, preferably with interconnected controller units. Where traffic control signals that are within 1/2 mile of one another along a major route have a jurisdictional boundary or a boundary between different signal systems between them, coordination across the boundary should be considered.</p> <p>Support:  Signal coordination need not be maintained between control sections that operate on different cycle lengths.</p> <p>For coordination with grade crossing signals and movable bridge signals, see Sections 4D.27, 4J.03, 8C.09, and 8C.10.</p>	<p>Compliance date kept in</p> <p>Recommend updating text</p>
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<p>see Sections 4D.27, 4J.03, 8C.09, and 8C.10.</p> <p><b>4D.2 Responsibility for Operation and Maintenance</b></p> <p><b>GUIDANCE</b>  Prior to installing any traffic control signal, the responsibility for the maintenance of the signal and all of the appurtenances, hardware, software, and the timing plan(s) should be clearly established. The responsible agency should provide for the maintenance of the traffic control signal and all of its appurtenances in a competent manner. To this end the agency should:  A. Keep every controller assembly in effective operation in accordance with its predetermined timing schedule; check the operation of the controller assembly frequently enough to verify that it is operating in accordance with the predetermined timing schedule; and establish a policy to maintain a record of all timing changes and that only authorized persons are permitted to make timing changes;  B. Clean the optical system of the signal sections and replace the light sources as frequently as experience proves necessary;  C. Clean and service equipment and other appurtenances as frequently as experience proves necessary;  D. Provide for alternate operation of the traffic control signal during a period of failure, using flashing mode or manual control, or manual traffic direction by proper authorities as might be required by traffic volumes or congestion, or by erecting other traffic control devices;  E. Have properly skilled maintenance</p>	<p><b>Section 4D.02 Responsibility for Operation and Maintenance</b></p> <p><i>Guidance:</i>  01 <i>Prior to installing any traffic control signal, the responsibility for the maintenance of the signal and all of the appurtenances, hardware, software, and the timing plan(s) should be clearly established. The responsible agency should provide for the maintenance of the traffic control signal and all of its appurtenances in a competent manner.</i>  02 <i>To this end the agency should:</i>  A. <i>Keep every controller assembly in effective operation in accordance with its predetermined timing schedule; check the operation of the controller assembly frequently enough to verify that it is operating in accordance with the predetermined timing schedule; and establish a policy to maintain a record of all timing changes and that only authorized persons are permitted to make timing changes;</i>  B. <i>Clean the optical system of the signal sections and replace the light sources as frequently as experience proves necessary;</i>  C. <i>Clean and service equipment and other appurtenances as frequently as experience proves necessary;</i>  D. <i>Provide for alternate operation of the traffic control signal during a period of failure, using flashing mode or manual control, or manual traffic direction by proper authorities as might be required by traffic volumes or congestion, or by erecting other traffic control devices;</i></p>	<p><b>4D.2 Responsibility for Operation and Maintenance</b></p> <p><b>GUIDANCE</b>  Prior to installing any traffic control signal, the responsibility for the maintenance of the signal and all of the appurtenances, hardware, software, and the timing plan(s) should be clearly established. The responsible agency should provide for the maintenance of the traffic control signal and all of its appurtenances in a competent manner. To this end the agency should:  A. Keep every controller assembly in effective operation in accordance with its predetermined timing schedule; check the operation of the controller assembly frequently enough to verify that it is operating in accordance with the predetermined timing schedule; and establish a policy to maintain a record of all timing changes and that only authorized persons are permitted to make timing changes;  B. Clean the optical system of the signal sections and replace the light sources as frequently as experience proves necessary;  C. Clean and service equipment and other appurtenances as frequently as experience proves necessary;  D. Provide for alternate operation of the traffic control signal during a period of failure, using flashing mode or manual control, or manual traffic direction by proper authorities as might be required by traffic volumes or congestion, or by erecting other traffic control devices;  E. Have properly skilled maintenance personnel available without undue delay for all signal malfunctions and signal indication</p>	<p>Recommend text change</p> <p>Recommend text change</p>
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<p>personnel available without undue delay for all <del>emergency and lamp failure calls</del> <b>signal malfunctions and signal indication failures</b>;</p> <p>F. Provide spare equipment to minimize the interruption of traffic control signal operation as a result of equipment failure;</p> <p>G. Provide for the availability of properly skilled maintenance personnel for the repair of all components; and</p> <p>H. Maintain the appearance of the signal displays and equipment.</p> <p>4D.3 Provisions for Pedestrians</p> <p><b>SUPPORT</b> Chapter 4E contains additional information regarding pedestrian signals <b>and Chapter 4F contains additional information regarding pedestrian hybrid beacons.</b></p> <p><b>STANDARD</b> The design and operation of traffic control signals shall take into consideration the needs of pedestrian as well as vehicular traffic.</p> <p>If engineering judgment indicates the need for provisions for a given pedestrian movement, signal faces conveniently visible to pedestrians shall be provided by pedestrian signal heads (see Chapter 4E) or a <b>vehicular</b> signal face(s) for <del>an adjacent</del> <b>a concurrent</b> vehicular movement.</p> <p><b>GUIDANCE</b> <del>Safety considerations should include the installation, where appropriate, of a</del> Accessible pedestrian signals (see Sections <del>4E.6 and</del> 4E.9</p>	<p><i>E. Have properly skilled maintenance personnel available without undue delay for all signal malfunctions and signal indication failures;</i></p> <p><i>F. Provide spare equipment to minimize the interruption of traffic control signal operation as a result of equipment failure;</i></p> <p><i>G. Provide for the availability of properly skilled maintenance personnel for the repair of all components; and</i></p> <p><i>H. Maintain the appearance of the signal displays and equipment.</i></p> <p><b>Section 4D.03 Provisions for Pedestrians</b></p> <p><b>Support:</b></p> <p>01 Chapter 4E contains additional information regarding pedestrian signals and Chapter 4F contains additional information regarding pedestrian hybrid beacons.</p> <p><b>Standard:</b></p> <p>02 <b>The design and operation of traffic control signals shall take into consideration the needs of pedestrian as well as vehicular traffic.</b></p> <p>03 <b>If engineering judgment indicates the need for provisions for a given pedestrian movement, signal faces conveniently visible to pedestrians shall be provided by pedestrian signal heads (see Chapter 4E) or a vehicular signal face(s) for a concurrent vehicular movement.</b></p> <p><i>Guidance:</i></p> <p>04 Accessible pedestrian signals (see Sections 4E.09 through 4E.13) that provide information in non-visual formats (such as audible tones,</p>	<p>failures;</p> <p>F. Provide spare equipment to minimize the interruption of traffic control signal operation as a result of equipment failure;</p> <p>G. Provide for the availability of properly skilled maintenance personnel for the repair of all components; and</p> <p>H. Maintain the appearance of the signal displays and equipment.</p> <p>4D.3 Provisions for Pedestrians</p> <p><b>SUPPORT</b> Chapter 4E contains additional information regarding pedestrian signals and Chapter 4F contains additional information regarding pedestrian hybrid beacons.</p> <p><b>STANDARD</b> The design and operation of traffic control signals shall take into consideration the needs of pedestrian as well as vehicular traffic.</p> <p>If engineering judgment indicates the need for provisions for a given pedestrian movement, signal faces conveniently visible to pedestrians shall be provided by pedestrian signal heads (see Chapter 4E) or a vehicular signal face(s) for a concurrent vehicular movement.</p> <p><b>GUIDANCE</b> Accessible pedestrian signals (see Sections 4E.9 through 4E.13) that provide information in nonvisual format (such as audible tones, speech messages, and/or vibrating surfaces) should be provided where determined</p>	<p>Recommend text change</p>
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<p>through 4E.13) that provide information in nonvisual format (such as audible tones, <del>verbal</del> speech messages, and/or vibrating surfaces) should be provided where determined appropriate by engineering judgment.</p> <p>Where pedestrian movements regularly occur, pedestrians should be provided with sufficient time to cross the roadway by adjusting the traffic control signal operation and timing to provide sufficient crossing time every cycle or by providing pedestrian detectors.</p> <p><b>OPTION</b></p> <p>If it is necessary or desirable to prohibit certain pedestrian movements at a traffic control signal location, <del>a PEDESTRIANS PROHIBITED (R9-3) or No Pedestrian Crossing (R9-3a)</del> signs may be used (see Section <del>2B.44</del> 2B.51) should be used if it is not practical to provide a barrier or other physical feature to physically prevent the pedestrian movements.</p>	<p><i>speech messages, and/or vibrating surfaces) should be provided where determined appropriate by engineering judgment.</i></p> <p><i>05 Where pedestrian movements regularly occur, pedestrians should be provided with sufficient time to cross the roadway by adjusting the traffic control signal operation and timing to provide sufficient crossing time every cycle or by providing pedestrian detectors.</i></p> <p><i>06 If it is necessary or desirable to prohibit certain pedestrian movements at a traffic control signal location, No Pedestrian Crossing (R9-3) signs (see Section 2B.51) should be used if it is not practical to provide a barrier or other physical feature to physically prevent the pedestrian movements.</i></p>	<p>appropriate by engineering judgment.</p> <p>Where pedestrian movements regularly occur, pedestrians should be provided with sufficient time to cross the roadway by adjusting the traffic control signal operation and timing to provide sufficient crossing time every cycle or by providing pedestrian detectors.</p> <p>If it is necessary or desirable to prohibit certain pedestrian movements at a traffic control signal location no Pedestrian Crossing (R9-3) signs (see Section 2B.51) should be used. A barrier or other physical feature to physically prevent the pedestrian movements <b>should be considered in lieu of, or in addition to, signs.</b></p>	<p>Recommend change with removal of text (“if it is not practical to provide) and Mn text</p>
<p>4D.4 Meaning of Vehicular Signal Indications</p> <p><b>SUPPORT</b></p> <p>The “Uniform Vehicle Code” (see Section 1A.11) is the primary source for the standards for the meaning of vehicular signal indications to both vehicle operators and pedestrians as <del>set forth</del> provided below in this Section, and the standards for the meaning of separate pedestrian signal head indications as <del>set forth</del> provided in Section 4E.2.</p> <p>The physical area that is defined as being “within the intersection” is dependent upon the conditions that are described in the definition</p>	<p><b>Section 4D.04 Meaning of Vehicular Signal Indications</b></p> <p>Support:</p> <p>01 The “Uniform Vehicle Code” (see Section 1A.11) is the primary source for the standards for the meaning of vehicular signal indications to both vehicle operators and pedestrians as provided in this Section, and the standards for the meaning of separate pedestrian signal head indications as provided in Section 4E.02.</p> <p>02 The physical area that is defined as being “within the intersection” is dependent upon the conditions that are described in the definition of intersection in Section 1A.13.</p>	<p>4D.4 Meaning of Vehicular Signal Indications</p> <p><b>SUPPORT</b></p> <p>The “Uniform Vehicle Code” (see Section 1A.11) is the primary source for the standards for the meaning of vehicular signal indications to both vehicle operators and pedestrians as provided in this Section, and the standards for the meaning of separate pedestrian signal head indications as provided in Section 4E.2.</p> <p>The physical area that is defined as being “within the intersection” is dependent upon the conditions that are described in the definition of intersection in Section 1A.13.</p>	<p>Does this committee still exist?</p> <p>Recommend change</p>

of intersection in Section 1A.13.

**STANDARD**

**Unless otherwise determined by law**, the following meanings shall be given to highway traffic signal indications for vehicles and pedestrians:

A. Steady green signal indications shall have the following meanings:

1. ~~Vehicular T~~~~traffic, except pedestrians,~~ facing a CIRCULAR GREEN signal indication is permitted to proceed straight through or turn right or left ~~or make a U-turn movement~~ except as such movement is modified by lane-use signs, turn prohibition signs, lane markings, ~~or~~ roadway design, ~~separate turn signal indication, or other traffic control devices.~~

~~But~~ Such vehicular traffic, including vehicles turning right or left ~~or making a U-turn movement,~~ shall yield the right-of-way to: ~~other vehicles, and to~~

(a) ~~P~~pedestrians lawfully within ~~the intersection or an adjacent associated crosswalk, at the time such signal indication is exhibited, and~~

(b) Other vehicles lawfully within the intersection.

In addition, vehicular traffic turning left or making a U-turn movement to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.

2. ~~Vehicular T~~~~traffic, except pedestrians,~~ facing a GREEN ARROW signal indication,

**Standard:**

**03 The following meanings shall be given to highway traffic signal indications for vehicles and pedestrians:**

**A. Steady green signal indications shall have the following meanings:**

**1. Vehicular traffic facing a CIRCULAR GREEN signal indication is permitted to proceed straight through or turn right or left or make a U-turn movement except as such movement is modified by lane-use signs, turn prohibition signs, lane markings, roadway design, separate turn signal indications, or other traffic control devices. Such vehicular traffic, including vehicles turning right or left or making a U-turn movement, shall yield the right-of-way to:**

**(a) Pedestrians lawfully within an associated crosswalk, and**

**(b) Other vehicles lawfully within the intersection.**

**In addition, vehicular traffic turning left or making a U-turn movement to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.**

**2. Vehicular traffic facing a GREEN ARROW signal indication, displayed alone**

**STANDARD**

**Unless otherwise determined by law**, the following meanings shall be given to highway traffic signal indications for vehicles and pedestrians:

A. Steady green signal indications shall have the following meanings:

1. Vehicular traffic facing a CIRCULAR GREEN signal indication is permitted to proceed straight through or turn right or left or make a U-turn movement except as such movement is modified by lane-use signs, turn prohibition signs, lane markings, roadway design, separate turn signal indication, or other traffic control devices.

Such vehicular traffic, including vehicles turning right or left or making a U-turn movement, shall yield the right-of-way to: (a) Pedestrians lawfully within an associated crosswalk and (b) Other vehicles lawfully within the intersection.

In addition, vehicular traffic turning left or making a U-turn movement to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.

2. Vehicular traffic facing a GREEN ARROW signal indication, displayed alone or in combination with another signal indication, is

Recommend change, leave Mn text.

<p><del>shown</del> displayed alone or in combination with another signal indication, is permitted to cautiously enter the intersection only to make the movement indicated by such arrow, or such other movement as is permitted by other signal indications <del>shown</del> displayed at the same time.</p> <p>Such vehicular traffic, including vehicles turning right or left or making a U-turn movement, shall yield the right-of-way to:</p> <p>(a) <del>p</del> Pedestrians lawfully within an <del>adjacent</del> associated crosswalk, and <del>to</del></p> <p>(b) <del>e</del> Other <del>traffic</del> vehicles lawfully using within the intersection.</p> <p>3. <del>Unless otherwise directed by a pedestrian signal head, p</del> Pedestrians facing <del>any a</del> CIRCULAR GREEN <del>green</del> signal indication, unless otherwise directed by a pedestrian signal indication or other traffic control device, <del>except when the sole green signal indication is a turn arrow</del> are permitted to proceed across the roadway within any marked or unmarked associated crosswalk. The pedestrian shall yield the right-of-way to vehicles lawfully within the intersection or so close as to create an immediate hazard at the time that the green signal indication is first <del>shown</del> displayed.</p> <p>4. Pedestrians facing a GREEN ARROW signal indication, unless otherwise directed by a pedestrian signal indication or other traffic control device, shall not cross the roadway.</p> <p>B. Steady yellow signal indications shall have the following meanings:</p> <p>1. Vehicular <del>T</del> traffic, <del>except pedestrians,</del> facing a steady CIRCULAR YELLOW or <del>YELLOW ARROW</del> signal indication is</p>	<p><b>or in combination with another signal indication, is permitted to cautiously enter the intersection only to make the movement indicated by such arrow, or such other movement as is permitted by other signal indications displayed at the same time. Such vehicular traffic, including vehicles turning right or left or making a U-turn movement, shall yield the right-of-way to:</b></p> <p><b>(a) Pedestrians lawfully within an associated crosswalk, and</b></p> <p><b>(b) Other vehicles lawfully within the intersection.</b></p> <p><b>3. Pedestrians facing a CIRCULAR GREEN signal indication, unless otherwise directed by a pedestrian signal indication or other traffic control device, are permitted to proceed across the roadway within any marked or unmarked associated crosswalk. The pedestrian shall yield the right-of-way to vehicles lawfully within the intersection or so close as to create an immediate hazard at the time that the green signal indication is first displayed.</b></p> <p><b>4. Pedestrians facing a GREEN ARROW signal indication, unless otherwise directed by a pedestrian signal indication or other traffic control device, shall not cross the roadway.</b></p> <p><b>B. Steady yellow signal indications shall have the following meanings:</b></p> <p><b>1. Vehicular traffic facing a steady CIRCULAR YELLOW signal indication is</b></p>	<p>permitted to cautiously enter the intersection only to make the movement indicated by such arrow, or such other movement as is permitted by other signal indications displayed at the same time.</p> <p>Such vehicular traffic, including vehicles turning right or left or making a U-turn movement, shall yield the right-of-way to:</p> <p>(a) Pedestrians lawfully within an associated crosswalk, and</p> <p>(b) Other vehicles lawfully within the intersection.</p> <p>3. Pedestrians facing a CIRCULAR GREEN signal indication, unless otherwise directed by a pedestrian signal indication or other traffic control device, are permitted to proceed across the roadway within any marked or unmarked associated crosswalk. The pedestrian shall yield the right-of-way to vehicles lawfully within the intersection or so close as to create an immediate hazard at the time that the green signal indication is first displayed.</p> <p>4. Pedestrians facing a GREEN ARROW signal indication, unless otherwise directed by a pedestrian signal indication or other traffic control device, shall not cross the roadway.</p> <p>B. Steady yellow signal indications shall have the following meanings:</p> <p>1. Vehicular traffic facing a steady</p>	<p>The Flashing Yellow Arrow is not used with the</p>
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<p>thereby warned that the related green movement <del>or the related flashing arrow movement</del> is being terminated or that a steady red signal indication will be <del>exhibited displayed</del> immediately thereafter when vehicular traffic shall not enter the intersection. <del>The rules set forth concerning vehicular operation under the movement(s) being terminated shall continue to apply while the steady CIRCULAR YELLOW signal indication is displayed.</del></p> <p>2. Vehicular traffic facing a steady YELLOW ARROW signal indication is thereby warned that the related GREEN ARROW movement or the related flashing arrow movement is being terminated. The rules set forth concerning vehicular operation under the movement(s) being terminated shall continue to apply while the steady YELLOW ARROW signal indication is displayed.</p> <p><del>32.</del> Pedestrians facing a steady CIRCULAR YELLOW or YELLOW ARROW signal indication, unless otherwise directed by a pedestrian <del>signal head, are thereby advised that there is insufficient time to cross the roadway before a red signal indication is shown, and no pedestrian</del> indication or other traffic control device shall <del>then</del> not start to cross the roadway.</p> <p>C. Steady red signal indications shall have the following meanings:</p> <p>1. Vehicular traffic facing a steady CIRCULAR RED signal indication <del>alone</del> unless entering the intersection to make another movement permitted by another signal indication shall stop at a clearly marked stop line, but if there is no stop line, traffic shall stop before entering the crosswalk on the near</p>	<p><b>thereby warned that the related green movement or the related flashing arrow movement is being terminated or that a steady red signal indication will be displayed immediately thereafter when vehicular traffic shall not enter the intersection. The rules set forth concerning vehicular operation under the movement(s) being terminated shall continue to apply while the steady CIRCULAR YELLOW signal indication is displayed.</b></p> <p><b>2. Vehicular traffic facing a steady YELLOW ARROW signal indication is thereby warned that the related GREEN ARROW movement or the related flashing arrow movement is being terminated. The rules set forth concerning vehicular operation under the movement(s) being terminated shall continue to apply while the steady YELLOW ARROW signal indication is displayed.</b></p> <p><b>3. Pedestrians facing a steady CIRCULAR YELLOW or YELLOW ARROW signal indication, unless otherwise directed by a pedestrian signal indication or other traffic control device shall not start to cross the roadway.</b></p> <p><b>C. Steady red signal indications shall have the following meanings:</b></p> <p><b>1. Vehicular traffic facing a steady CIRCULAR RED signal indication, unless entering the intersection to make another movement permitted by another signal indication, shall stop at a clearly marked stop line; but if there is no stop line, traffic shall stop before entering the crosswalk on</b></p>	<p>CIRCULAR YELLOW or signal indication is thereby warned that the related green movement <del>or the related flashing arrow movement</del> is being terminated or that a steady red signal indication will be displayed immediately thereafter when vehicular traffic shall not enter the intersection. The rules set forth concerning vehicular operation under the movement(s) being terminated shall continue to apply while the steady CIRCULAR YELLOW signal indication is displayed.</p> <p>2. Vehicular traffic facing a steady YELLOW ARROW signal indication is thereby warned that the related GREEN ARROW movement or the related flashing arrow movement is being terminated. The rules set forth concerning vehicular operation under the movement(s) being terminated shall continue to apply while the steady YELLOW ARROW signal indication is displayed.</p> <p>3. Pedestrians facing a steady CIRCULAR YELLOW or YELLOW ARROW signal indication, unless otherwise directed by a pedestrian indication or other traffic control device shall not start to cross the roadway.</p> <p>C. Steady red signal indications shall have the following meanings:</p> <p>1. Vehicular traffic facing a steady CIRCULAR RED signal indication unless entering the intersection to make another movement permitted by another signal indication shall stop at a clearly marked stop line, but if there is no stop line, traffic shall</p>	<p>Circular Yellow we do not know intent of having that language in this section. This is a standard, but we would like to remove FYA from section B1 or get some clarification</p> <p>Recommend changes</p> <p>Recommend changes</p>
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<p>side of the intersection; or if there is no crosswalk, then before entering the intersection, and shall remain stopped until a signal indication to proceed is <del>shown displayed</del>, or as provided below.</p> <p>Except when a <del>sign</del> traffic control device is in place prohibiting a turn on red or a steady RED ARROW signal indication is displayed, vehicular traffic facing a steady CIRCULAR RED signal indication is permitted to enter the intersection to turn right, or to turn left from a one-way street into a one-way street, after stopping. <del>Such vehicular traffic shall yield the right of way to pedestrians lawfully within an adjacent crosswalk and to other traffic lawfully using the intersection.</del> The right to proceed with the turn shall be subject to the rules applicable after making a stop at a STOP sign.</p> <p>2. Vehicular traffic facing a steady RED ARROW signal indication shall not enter the intersection to make the movement indicated by the arrow and, unless entering the intersection to make another movement permitted by another signal indication, shall stop at a clearly marked stop line; but if there is no stop line, before entering the crosswalk on the near side of the intersection; or if there is no crosswalk, then before entering the intersection; and shall remain stopped until a signal indication <del>or other traffic control device</del> permitting the movement indicated by such RED ARROW is <del>shown displayed</del>.</p> <p><del>When an R10-17a sign (see Section 2B.45) a traffic control device is in place permitting a turn on a steady RED ARROW signal indication, vehicular traffic facing a steady RED ARROW signal indication is permitted to</del></p>	<p><b>the near side of the intersection; or if there is no crosswalk, then before entering the intersection; and shall remain stopped until a signal indication to proceed is displayed, or as provided below.</b></p> <p><b>Except when a traffic control device is in place prohibiting a turn on red or a steady RED ARROW signal indication is displayed, vehicular traffic facing a steady CIRCULAR RED signal indication is permitted to enter the intersection to turn right, or to turn left from a one-way street into a one-way street, after stopping. The right to proceed with the turn shall be subject to the rules applicable after making a stop at a STOP sign.</b></p> <p><b>2. Vehicular traffic facing a steady RED ARROW signal indication shall not enter the intersection to make the movement indicated by the arrow and, unless entering the intersection to make another movement permitted by another signal indication, shall stop at a clearly marked stop line; but if there is no stop line, before entering the crosswalk on the near side of the intersection; or if there is no crosswalk, then before entering the intersection; and shall remain stopped until a signal indication or other traffic control device permitting the movement indicated by such RED ARROW is displayed.</b></p> <p><b>When a traffic control device is in place permitting a turn on a steady RED ARROW signal indication, vehicular traffic facing a steady RED ARROW signal indication is permitted to enter the intersection to make the movement indicated by the arrow signal</b></p>	<p>stop before entering the crosswalk on the near side of the intersection; or if there is no crosswalk, then before entering the intersection, and shall remain stopped until a signal indication to proceed is displayed, or as provided below.</p> <p>Except when a traffic control device is in place prohibiting a turn on red or a steady RED ARROW signal indication is displayed, vehicular traffic facing a steady CIRCULAR RED signal indication is permitted to enter the intersection to turn right, or to turn left from a one-way street into a one-way street, after stopping. The right to proceed with the turn shall be subject to the rules applicable after making a stop at a STOP sign.</p> <p>2. Vehicular traffic facing a steady RED ARROW signal indication shall not enter the intersection to make the movement indicated by the arrow and, unless entering the intersection to make another movement permitted by another signal indication, shall stop at a clearly marked stop line; but if there is no stop line, before entering the crosswalk on the near side of the intersection, ; or if there is no crosswalk, then before entering the intersection; and shall remain stopped until a signal indication permitting the movement indicated by such RED ARROW is displayed.</p> <p><b>When a traffic control device is in place permitting a turn on a steady RED ARROW signal indication, vehicular traffic facing a steady RED ARROW signal indication is permitted to enter the intersection make the movement indicated by the arrow signal indication, after stopping. The right to proceed</b></p>	<p>Committee would like to remove this language and not allow turns on RED ARROWS.</p>
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<p><del>enter the intersection to turn right, or to turn left from a one-way street into a one-way street make the movement indicated by the arrow signal indication, after stopping. Such vehicular traffic shall yield the right-of-way to pedestrians lawfully within an adjacent crosswalk and to other traffic lawfully using the intersection. The right to proceed with the turn shall be limited to the direction indicated by the arrow and shall be subject to the rules applicable after making a stop at a STOP sign.</del></p> <p>3. Unless otherwise directed by a pedestrian signal <del>head</del> indication or other traffic control device, pedestrians facing a steady CIRCULAR RED or steady RED ARROW signal indication <del>alone</del> shall not enter the roadway.</p> <p><del>D. Flashing signal indications shall have the following meanings:</del></p> <p><del>1. Flashing yellow—When a yellow lens is illuminated with rapid intermittent flashes, vehicular traffic is permitted to proceed through the intersection or past such signal indication only with caution.</del></p> <p><del>2. Flashing red—When a red lens is illuminated with rapid intermittent flashes, vehicular traffic shall stop at a clearly marked stop line; but if there is no stop line, traffic shall stop before entering the crosswalk on the near side of the intersection; or if there is no crosswalk, at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection. The right to proceed shall be subject to the rules applicable after making a stop at a STOP sign.</del></p> <p><del>3. Flashing RED ARROW and flashing YELLOW ARROW signal indications have the same meaning as the corresponding</del></p>	<p><b>indication, after stopping. The right to proceed with the turn shall be limited to the direction indicated by the arrow and shall be subject to the rules applicable after making a stop at a STOP sign.</b></p> <p><b>3. Unless otherwise directed by a pedestrian signal indication or other traffic control device, pedestrians facing a steady CIRCULAR RED or steady RED ARROW signal indication shall not enter the roadway.</b></p>	<p><del>with the turn shall be limited to the direction indicated by the arrow and shall be subject to the rules applicable after making a stop at a STOP sign</del></p> <p>3. Unless otherwise directed by a pedestrian signal indication or other traffic control device, pedestrians facing a steady CIRCULAR RED or steady RED ARROW signal indication shall not enter the roadway.</p>	<p>If a turn after stop is to be permitted then a red ball or flashing red arrow can be used.</p> <p>Recommend changes</p> <p>Recommend deleting language</p>
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~~flashing circular signal indication, except that they apply only to vehicular traffic intending to make the movement indicated by the arrow.~~

D. A flashing green signal indication has no meaning and shall not be used.

E. Flashing yellow signal indications shall have the following meanings:

1. Vehicular traffic, on an approach to an intersection, facing a flashing CIRCULAR YELLOW signal indication is permitted to cautiously enter the intersection to proceed straight through or turn right or left or make a U-turn except as such movement is modified by lane-use signs, turn prohibition signs, lane markings, roadway design, separate turn signal indications, or other traffic control devices.

Such vehicular traffic, including vehicles turning right or left or making a U-turn, shall yield the right-of-way to:

- (a) Pedestrians lawfully within an associated crosswalk, and
- (b) Other vehicles lawfully within the intersection.

In addition, vehicular traffic turning left or making a U-turn to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.

2. Vehicular traffic, on an approach to an intersection, facing a flashing YELLOW ARROW signal indication, displayed alone or in combination with another signal indication, is permitted to cautiously enter the intersection only to make the movement indicated by such arrow, or other such movement as is permitted by other signal indications displayed at the same time.

**D. A flashing green signal indication has no meaning and shall not be used.**

**E. Flashing yellow signal indications shall have the following meanings:**

**1. Vehicular traffic, on an approach to an intersection, facing a flashing CIRCULAR YELLOW signal indication is permitted to cautiously enter the intersection to proceed straight through or turn right or left or make a U-turn except as such movement is modified by lane-use signs, turn prohibition signs, lane markings, roadway design, separate turn signal indications, or other traffic control devices.**

**Such vehicular traffic, including vehicles turning right or left or making a U-turn, shall yield the right-of-way to:**

- (a) Pedestrians lawfully within an associated crosswalk, and**
- (b) Other vehicles lawfully within the intersection.**

**In addition, vehicular traffic turning left or making a U-turn to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.**

**2. Vehicular traffic, on an approach to an intersection, facing a flashing YELLOW ARROW signal indication, displayed alone or in combination with another signal indication, is permitted to cautiously enter the intersection only to make the movement indicated by such arrow, or other such movement as is permitted by other signal**

D. A flashing green signal indication has no meaning and shall not be used.

E. Flashing yellow signal indications shall have the following meanings:

1. Vehicular traffic, on an approach to an intersection, facing a flashing CIRCULAR YELLOW signal indication is permitted to cautiously enter the intersection to proceed straight through or turn right or left or make a U-turn except as such movement is modified by lane-use signs, turn prohibition signs, lane markings, roadway design, separate turn signal indications, or other traffic control devices.

Such vehicular traffic, including vehicles turning right or left or making a U-turn, shall yield the right-of-way to:

- (a) Pedestrians lawfully within an associated crosswalk, and
- (b) Other vehicles lawfully within the intersection.

In addition, vehicular traffic turning left or making a U-turn to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.

2. Vehicular traffic, on an approach to an intersection, facing a flashing YELLOW ARROW signal indication, displayed alone or in combination with another signal indication, is permitted to cautiously enter the intersection only to make the movement indicated by such arrow, or other such movement as is permitted by other signal indications displayed at the same time.

Recommend adding language

<p>Such vehicular traffic, including vehicles turning right or left or making a U-turn, shall yield the right-of-way to:</p> <p>(a) Pedestrians lawfully within an associated crosswalk, and</p> <p>(b) Other vehicles lawfully within the intersection.</p> <p>In addition, vehicular traffic turning left or making a U-turn to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.</p> <p>3. Pedestrians facing any flashing yellow signal indication at an intersection, unless otherwise directed by a pedestrian signal indication or other traffic control device, are permitted to proceed across the roadway within any marked or unmarked associated crosswalk. Pedestrians shall yield the right-of-way to vehicles lawfully within the intersection at the time that the flashing yellow signal indication is first displayed.</p> <p>4. When a flashing CIRCULAR YELLOW signal indication(s) is displayed as a beacon (see Chapter 4L) to supplement another traffic control device, road users are notified that there is a need to pay extra attention to the message contained thereon or that the regulatory or warning requirements of the other traffic control device, which might not be applicable at all times, are currently applicable.</p> <p>F. Flashing red signal indications shall have the following meanings:</p> <p>1. Vehicular traffic, on an approach to an intersection, facing a flashing CIRCULAR RED signal indication shall stop at a clearly marked stop line; but if there is no stop line, before entering the crosswalk on the near side</p>	<p><b>indications displayed at the same time.</b></p> <p><b>Such vehicular traffic, including vehicles turning right or left or making a U-turn, shall yield the right-of-way to:</b></p> <p><b>(a) Pedestrians lawfully within an associated crosswalk, and</b></p> <p><b>(b) Other vehicles lawfully within the intersection.</b></p> <p><b>In addition, vehicular traffic turning left or making a U-turn to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.</b></p> <p><b>3. Pedestrians facing any flashing yellow signal indication at an intersection, unless otherwise directed by a pedestrian signal indication or other traffic control device, are permitted to proceed across the roadway within any marked or unmarked associated crosswalk. Pedestrians shall yield the right-of-way to vehicles lawfully within the intersection at the time that the flashing yellow signal indication is first displayed.</b></p> <p><b>4. When a flashing CIRCULAR YELLOW signal indication(s) is displayed as a beacon (see Chapter 4L) to supplement another traffic control device, road users are notified that there is a need to pay extra attention to the message contained thereon or that the regulatory or warning requirements of the other traffic control device, which might not be applicable at all times, are currently applicable.</b></p> <p><b>F. Flashing red signal indications shall have the following meanings:</b></p> <p><b>1. Vehicular traffic, on an approach to an intersection, facing a flashing CIRCULAR RED signal indication shall stop at a clearly</b></p>	<p>Such vehicular traffic, including vehicles turning right or left or making a U-turn, shall yield the right-of-way to:</p> <p>(a) Pedestrians lawfully within an associated crosswalk, and</p> <p>(b) Other vehicles lawfully within the intersection.</p> <p>In addition, vehicular traffic turning left or making a U-turn to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.</p> <p>3. Pedestrians facing any flashing yellow signal indication at an intersection, unless otherwise directed by a pedestrian signal indication or other traffic control device, are permitted to proceed across the roadway within any marked or unmarked associated crosswalk. Pedestrians shall yield the right-of-way to vehicles lawfully within the intersection at the time that the flashing yellow signal indication is first displayed.</p> <p>4. When a flashing CIRCULAR YELLOW signal indication(s) is displayed as a beacon (see Chapter 4L) to supplement another traffic control device, road users are notified that there is a need to pay extra attention to the message contained thereon or that the regulatory or warning requirements of the other traffic control device, which might not be applicable at all times, are currently applicable.</p> <p>F. Flashing red signal indications shall have the following meanings:</p> <p>1. Vehicular traffic, on an approach to an intersection, facing a flashing CIRCULAR RED signal indication shall stop at a clearly marked stop line; but if there is no stop line, before entering the crosswalk on the near side</p>	
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<p>of the intersection; or if there is no crosswalk, at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection. The right to proceed shall be subject to the rules applicable after making a stop at a STOP sign.</p> <p>2. Vehicular traffic, on an approach to an intersection, facing a flashing RED ARROW signal indication if intending to turn in the direction indicated by the arrow shall stop at a clearly marked stop line; but if there is no stop line, before entering the crosswalk on the near side of the intersection; or if there is no crosswalk, at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection. The right to proceed with the turn shall be limited to the direction indicated by the arrow and shall be subject to the rules applicable after making a stop at a STOP sign.</p> <p>3. Pedestrians facing any flashing red signal indication at an intersection, unless otherwise directed by a pedestrian signal indication or other traffic control device, are permitted to proceed across the roadway within any marked or unmarked associated crosswalk. Pedestrians shall yield the right-of-way to vehicles lawfully within the intersection at the time that the flashing red signal indication is first displayed.</p> <p>4. When a flashing CIRCULAR RED signal indication(s) is displayed as a beacon (see Chapter 4L) to supplement another traffic control device, road users are notified that there is a need to pay extra attention to the message contained thereon or that the regulatory requirements of the other traffic control device, which might not be applicable at all times, are currently applicable.</p>	<p><b>marked stop line; but if there is no stop line, before entering the crosswalk on the near side of the intersection; or if there is no crosswalk, at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection. The right to proceed shall be subject to the rules applicable after making a stop at a STOP sign.</b></p> <p><b>2. Vehicular traffic, on an approach to an intersection, facing a flashing RED ARROW signal indication if intending to turn in the direction indicated by the arrow shall stop at a clearly marked stop line; but if there is no stop line, before entering the crosswalk on the near side of the intersection; or if there is no crosswalk, at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection. The right to proceed with the turn shall be limited to the direction indicated by the arrow and shall be subject to the rules applicable after making a stop at a STOP sign.</b></p> <p><b>3. Pedestrians facing any flashing red signal indication at an intersection, unless otherwise directed by a pedestrian signal indication or other traffic control device, are permitted to proceed across the roadway within any marked or unmarked associated crosswalk. Pedestrians shall yield the right-of-way to vehicles lawfully within the intersection at the time that the flashing red signal indication is first displayed.</b></p> <p><b>4. When a flashing CIRCULAR RED signal indication(s) is displayed as a beacon (see Chapter 4L) to supplement another traffic control device, road users are notified that</b></p>	<p>of the intersection; or if there is no crosswalk, at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection. The right to proceed shall be subject to the rules applicable after making a stop at a STOP sign.</p> <p>2. Vehicular traffic, on an approach to an intersection, facing a flashing RED ARROW signal indication if intending to turn in the direction indicated by the arrow shall stop at a clearly marked stop line; but if there is no stop line, before entering the crosswalk on the near side of the intersection; or if there is no crosswalk, at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection. The right to proceed with the turn shall be limited to the direction indicated by the arrow and shall be subject to the rules applicable after making a stop at a STOP sign.</p> <p>3. Pedestrians facing any flashing red signal indication at an intersection, unless otherwise directed by a pedestrian signal indication or other traffic control device, are permitted to proceed across the roadway within any marked or unmarked associated crosswalk. Pedestrians shall yield the right-of-way to vehicles lawfully within the intersection at the time that the flashing red signal indication is first displayed.</p> <p>4. When a flashing CIRCULAR RED signal indication(s) is displayed as a beacon (see Chapter 4L) to supplement another traffic control device, road users are notified that there is a need to pay extra attention to the message contained thereon or that the regulatory requirements of the other traffic control device, which might not be applicable at all times, are currently applicable.</p>	
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<p>Use of this signal indication shall be limited to supplementing STOP (R1-1), DO NOT ENTER (R5-1), or WRONG WAY (R5-1a) signs, and to applications where compliance with the supplemented traffic control device requires a stop at a designated point.</p> <p>4D.5 Application of Steady Signal Indications</p> <p>STANDARD</p> <p>When a traffic control signal is being operated in a steady (stop-and-go) mode, at least one <del>lens</del> <b>indication</b> in each signal face shall be <del>illuminated</del> <b>displayed</b> at any given time. A signal face(s) that controls a particular vehicular movement during any interval of a cycle shall control that same movement during all intervals of the cycle. Steady signal indications shall be applied as follows:</p> <p>A. A steady CIRCULAR RED signal indication:</p> <ol style="list-style-type: none"> <li>1. Shall be displayed when it is intended to prohibit traffic, except pedestrians directed by a pedestrian signal head, from entering the intersection or other controlled area. Turning after stopping is permitted as stated in Item C.1 in Paragraph 3 of Section 4D.4.</li> <li>2. Shall be displayed with the appropriate</li> </ol>	<p><b>there is a need to pay extra attention to the message contained thereon or that the regulatory requirements of the other traffic control device, which might not be applicable at all times, are currently applicable.</b></p> <p><b>Use of this signal indication shall be limited to supplementing STOP (R1-1), DO NOT ENTER (R5-1), or WRONG WAY (R5-1a) signs, and to applications where compliance with the supplemented traffic control device requires a stop at a designated point.</b></p> <p><b>Section 4D.05 Application of Steady Signal Indications</b></p> <p><b>Standard:</b></p> <p>01 <b>When a traffic control signal is being operated in a steady (stop-and-go) mode, at least one indication in each signal face shall be displayed at any given time.</b></p> <p>02 <b>A signal face(s) that controls a particular vehicular movement during any interval of a cycle shall control that same movement during all intervals of the cycle.</b></p> <p>03 <b>Steady signal indications shall be applied as follows:</b></p> <p><b>A. A steady CIRCULAR RED signal indication:</b></p> <ol style="list-style-type: none"> <li>1. <b>Shall be displayed when it is intended to prohibit traffic, except pedestrians directed by a pedestrian signal head, from entering the intersection or other controlled area. Turning after stopping is permitted as stated in Item C.1 in Paragraph 3 of Section 4D.04.</b></li> <li>2. <b>Shall be displayed with the appropriate</b></li> </ol>	<p>Use of this signal indication shall be limited to supplementing STOP (R1-1), DO NOT ENTER (R5-1), or WRONG WAY (R5-1a) signs, and to applications where compliance with the supplemented traffic control device requires a stop at a designated point.</p> <p>4D.5 Application of Steady Signal Indications</p> <p>STANDARD</p> <p>When a traffic control signal is being operated in a steady (stop-and-go) mode, at least one indication in each signal face shall be displayed at any given time. A signal face(s) that controls a particular vehicular movement during any interval of a cycle shall control that same movement during all intervals of the cycle. Steady signal indications shall be applied as follows:</p> <p>A. A steady CIRCULAR RED signal indication:</p> <ol style="list-style-type: none"> <li>1. Shall be displayed when it is intended to prohibit traffic, except pedestrians directed by a pedestrian signal head, from entering the intersection or other controlled area. Turning after stopping is permitted as stated in Item C.1 of Section 4D.4.</li> <li>2. Shall be displayed with the appropriate GREEN ARROW signal indications when it is intended to permit traffic to make a specified</li> </ol>	<p>Recommend updating language</p> <p>Remove paragraph</p>
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<p>GREEN ARROW signal indications when it is intended to permit traffic to make a specified turn or turns, and to prohibit traffic from proceeding straight ahead through the intersection or other controlled area, except in protected only mode <del>turn signal faces operation</del> (see Sections 4D.19 and 4D.23, or in <b>protected/permissive mode operation with separate turn signal faces</b> (see Sections 4D.20 and 4D.24).</p> <p>B. A steady CIRCULAR YELLOW signal indication:</p> <ol style="list-style-type: none"> <li>1. Shall be displayed following a CIRCULAR GREEN or straight-through GREEN ARROW signal indication in the same signal face.</li> <li>2. Shall not be displayed in conjunction with the change from the CIRCULAR RED signal indication to the CIRCULAR GREEN signal indication.</li> <li>3. Shall be followed by a CIRCULAR RED signal indication except that, when entering preemption operation, the return to the previous CIRCULAR GREEN signal indication shall be permitted following a <b>steady CIRCULAR YELLOW</b> signal indication (see Section 4D.<del>27</del><del>13</del>).</li> <li>4. Shall not be displayed to an approach from which drivers are turning left permissively <b>or making a U-turn to the left permissively</b> unless <b>one of the following conditions exists:</b> <ol style="list-style-type: none"> <li>(a) <del>A a</del> steady CIRCULAR YELLOW signal indication is also <b>simultaneously</b> being <b>displayed</b> <del>shown simultaneously</del> to the opposing approach.</li> <li><del>(b) A separate left turn signal face is provided and operated as described in Section 4D.06</del></li> <li>(b) An engineering study has determined that, because of unique intersection conditions, the conditions described in Items (a) <del>and (b) above</del> cannot reasonably be implemented without</li> </ol> </li> </ol>	<p><b>GREEN ARROW signal indications when it is intended to permit traffic to make a specified turn or turns, and to prohibit traffic from proceeding straight ahead through the intersection or other controlled area, except in protected only mode operation (see Sections 4D.19 and 4D.23), or in protected/permissive mode operation with separate turn signal faces (see Sections 4D.20 and 4D.24).</b></p> <p><b>B. A steady CIRCULAR YELLOW signal indication:</b></p> <ol style="list-style-type: none"> <li><b>1. Shall be displayed following a CIRCULAR GREEN or straight-through GREEN ARROW signal indication in the same signal face.</b></li> <li><b>2. Shall not be displayed in conjunction with the change from the CIRCULAR RED signal indication to the CIRCULAR GREEN signal indication.</b></li> <li><b>3. Shall be followed by a CIRCULAR RED signal indication except that, when entering preemption operation, the return to the previous CIRCULAR GREEN signal indication shall be permitted following a steady CIRCULAR YELLOW signal indication (see Section 4D.27).</b></li> <li><b>4. Shall not be displayed to an approach from which drivers are turning left permissively or making a U-turn to the left permissively unless one of the following conditions exists:</b> <ol style="list-style-type: none"> <li><b>(a) A steady CIRCULAR YELLOW signal indication is also simultaneously being displayed to the opposing approach;</b></li> <li><b>(b) An engineering study has determined that, because of unique intersection</b></li> </ol> </li> </ol>	<p>turn or turns, and to prohibit traffic from proceeding straight ahead through the intersection or other controlled area, except in protected only mode operation (see Sections 4D.19 and 4D.23, or in protected/permissive mode operation with separate turn signal faces (see Sections 4D.20 and 4D.24).</p> <p>B. A steady CIRCULAR YELLOW signal indication:</p> <ol style="list-style-type: none"> <li>1. Shall be displayed following a CIRCULAR GREEN or straight-through GREEN ARROW signal indication in the same signal face.</li> <li>2. Shall not be displayed in conjunction with the change from the CIRCULAR RED signal indication to the CIRCULAR GREEN signal indication.</li> <li>3. Shall be followed by a CIRCULAR RED signal indication except that, when entering preemption operation, the return to the previous CIRCULAR GREEN signal indication shall be permitted following a steady CIRCULAR YELLOW signal indication (see Section 4D.27).</li> <li>4. Shall not be displayed to an approach from which drivers are turning left permissively or making a U-turn to the left permissively unless one of the following conditions exists: <ol style="list-style-type: none"> <li>(a) A steady CIRCULAR YELLOW signal indication is also simultaneously being displayed to the opposing approach.</li> <li><b>(b) An engineering study has determined that, because of unique intersection conditions, the conditions described in Item (a) cannot reasonably be implemented without causing significant operational or safety problems and that the volume of impacted left turning or U-turning traffic is relatively low, and those left</b></li> </ol> </li> </ol>	<p>reference</p> <p>Orange language not marked as new in fed manual, but not in 2005 Mn manual</p> <p>Committee recommends adopting current Federal language <del>including adding orange language back into Mn manual</del> <b>MCUTCD committee recommends not adopting the orange language because we don't allow Dallas phasing. This makes the standard more strict, so is allowed.</b></p>
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<p>causing significant operational or safety problems and that the volume of impacted left-turning or U-turning traffic is relatively low, and those left-turning or U-turning drivers are advised that a steady CIRCULAR YELLOW signal indication <del>the opposing traffic is not simultaneously being shown- displayed a CIRCULAR YELLOW signal indication to the opposing traffic</del> if this operation occurs continuously by the installation near the left-most signal head of a W25-1 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC HAS EXTENDED GREEN; OR (c) Drivers are advised of the operation if it occurs only occasionally, such as during a preemption sequence <del>or because of the skipping of actuated phases</del>, by the installation near the left-most signal head of a W25-2 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN.</p> <p><del>COMPLIANCE DATE: DECEMBER 22, 2008</del></p> <p>C. A steady CIRCULAR GREEN signal indication shall be displayed only when it is intended to permit traffic to proceed in any direction that is lawful and practical.</p> <p>D. A steady RED ARROW signal indication shall be displayed when it is intended to prohibit traffic, except pedestrians directed by a pedestrian signal head, from entering the intersection or other controlled area to make the indicated turn. <del>Except as described in Item C.2 in Paragraph 3 of Section 4D.4</del>, Turning on a steady RED ARROW signal indication shall not be permitted.</p> <p>E. A steady YELLOW ARROW signal indication:</p>	<p><b>conditions, the condition described in Item (a) cannot reasonably be implemented without causing significant operational or safety problems and that the volume of impacted left-turning or U-turning traffic is relatively low, and those left-turning or U-turning drivers are advised that a steady CIRCULAR YELLOW signal indication is not simultaneously being displayed to the opposing traffic if this operation occurs continuously by the installation near the left-most signal head of a W25-1 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC HAS EXTENDED GREEN; or (c) Drivers are advised of the operation if it occurs only occasionally, such as during a preemption sequence, by the installation near the left-most signal head of a W25-2 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN.</b></p> <p><b>C. A steady CIRCULAR GREEN signal indication shall be displayed only when it is intended to permit traffic to proceed in any direction that is lawful and practical.</b></p> <p><b>D. A steady RED ARROW signal indication shall be displayed when it is intended to prohibit traffic, except pedestrians directed by a pedestrian signal head, from entering the intersection or other controlled area to make the indicated turn. Except as described in Item C.2 in Paragraph 3 of Section 4D.04, turning on a steady RED ARROW signal indication shall not be permitted.</b></p> <p><b>E. A steady YELLOW ARROW signal indication:</b></p>	<p><del>turning or U-turning drivers are advised that a steady CIRCULAR YELLOW signal indication is not simultaneously being displayed to the opposing traffic if this operation occurs continuously by the installation near the left-most signal head of a W25-1 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC HAS EXTENDED GREEN; OR (c) Drivers are advised of the operation if it occurs only occasionally, such as during a preemption sequence, by the installation near the left-most signal head of a W25-2 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN.</del></p> <p>C. A steady CIRCULAR GREEN signal indication shall be displayed only when it is intended to permit traffic to proceed in any direction that is lawful and practical.</p> <p>D. A steady RED ARROW signal indication shall be displayed when it is intended to prohibit traffic, except pedestrians directed by a pedestrian signal head, from entering the intersection or other controlled area to make the indicated turn. Turning on a steady RED ARROW signal indication shall not be permitted.</p> <p>E. A steady YELLOW ARROW signal indication: 1. Shall be displayed in the same direction as a</p>	<p>End 2-9-2011 MCUTCD mtg</p> <p>Begin 3-23-11 MCUTCD mtg</p> <p>Remove reference to turning on red arrow based on earlier removal</p> <p>Recommend</p>
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<p>1. Shall be displayed in the same direction as a GREEN ARROW signal indication following a GREEN ARROW signal indication in the same signal face, unless:</p> <p>(a) The GREEN ARROW signal indication and a CIRCULAR GREEN (or straight-through GREEN ARROW) signal indication terminate simultaneously in the same signal face, or</p> <p>(b) The green arrow is a straight-through GREEN ARROW (see Item B.1).</p> <p>2. Shall be displayed in the same direction as a flashing YELLOW ARROW signal indication or flashing RED ARROW signal indication following a flashing YELLOW ARROW signal indication or flashing RED ARROW signal indication in the same signal face, when the flashing arrow indication is displayed as part of a steady mode operation, if the signal face will subsequently display a steady red signal indication.</p> <p>3. Shall not be displayed in conjunction with the change from a steady RED ARROW, flashing RED ARROW, or flashing YELLOW ARROW signal indication to a GREEN ARROW signal indication except when entering preemption operation as provided in Item 5(a).</p> <p>4. Shall not be displayed when any conflicting vehicular movement has a green or yellow signal indication (except for the situation regarding U-turns to the left provided in Paragraph 4) or any conflicting pedestrian movement has a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication, except that a steady left-turn (or U-turn to the left) YELLOW ARROW signal indication used to terminate a flashing left-turn (or U-turn to the left) YELLOW ARROW or a flashing left-turn (or U-turn to the left) RED</p>	<p><b>1. Shall be displayed in the same direction as a GREEN ARROW signal indication following a GREEN ARROW signal indication in the same signal face, unless:</b></p> <p><b>(a) The GREEN ARROW signal indication and a CIRCULAR GREEN (or straight-through GREEN ARROW) signal indication terminate simultaneously in the same signal face, or</b></p> <p><b>(b) The green arrow is a straight-through GREEN ARROW (see Item B.1).</b></p> <p><b>2. Shall be displayed in the same direction as a flashing YELLOW ARROW signal indication or flashing RED ARROW signal indication following a flashing YELLOW ARROW signal indication or flashing RED ARROW signal indication in the same signal face, when the flashing arrow indication is displayed as part of a steady mode operation, if the signal face will subsequently display a steady red signal indication.</b></p> <p><b>3. Shall not be displayed in conjunction with the change from a steady RED ARROW, flashing RED ARROW, or flashing YELLOW ARROW signal indication to a GREEN ARROW signal indication, except when entering preemption operation as provided in Item 5(a).</b></p> <p><b>4. Shall not be displayed when any conflicting vehicular movement has a green or yellow signal indication (except for the situation regarding U-turns to the left provided in Paragraph 4) or any conflicting pedestrian movement has a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication, except that a steady left-turn (or U-turn to the left) YELLOW ARROW signal indication used</b></p>	<p>GREEN ARROW signal indication following a GREEN ARROW signal indication in the same signal face, unless:</p> <p>(a) The GREEN ARROW signal indication and a CIRCULAR GREEN (or straight-through GREEN ARROW) signal indication terminate simultaneously in the same signal face, or</p> <p>(b) The green arrow is a straight-through GREEN ARROW (see Item B.1).</p> <p>2. Shall be displayed in the same direction as a flashing YELLOW ARROW signal indication or flashing RED ARROW signal indication following a flashing YELLOW ARROW signal indication or flashing RED ARROW signal indication in the same signal face, when the flashing arrow indication is displayed as part of a steady mode operation, if the signal face will subsequently display a steady red signal indication.</p> <p>3. Shall not be displayed in conjunction with the change from a steady RED ARROW, flashing RED ARROW, or flashing YELLOW ARROW signal indication to a GREEN ARROW signal indication except when entering preemption operation as provided in Item 5(a).</p> <p>4. Shall not be displayed when any conflicting vehicular movement has a green or yellow signal indication (except for the situation regarding U-turns to the left provided in Paragraph 4) or any conflicting pedestrian movement has a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication, except that a steady left-turn (or U-turn to the left) YELLOW ARROW signal indication used to terminate a flashing left-turn (or U-turn to the left) YELLOW ARROW or a flashing left-turn (or U-turn to the left) RED ARROW signal indication in a signal face</p>	<p>changing text</p>
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<p>ARROW signal indication in a signal face controlling a permissive left-turn (or U-turn to the left) movement as described in Sections 4D.18 and 4D.20 shall be permitted to be displayed when a CIRCULAR YELLOW signal indication is displayed for the opposing through movement. Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or raised channelization clearly indicate which departure lane to use.</p> <p>5. Shall not be displayed to terminate a flashing arrow signal indication on an approach from which drivers are turning left permissively or making a U-turn to the left permissively unless one of the following conditions exists:</p> <p>(a) A steady CIRCULAR YELLOW signal indication is also simultaneously being displayed to the opposing approach;</p> <p>(b) An engineering study has determined that, because of unique intersection conditions, the condition described in Item (a) cannot reasonably be implemented without causing significant operational or safety problems and that the volume of impacted left-turning or U-turning traffic is relatively low, and those left-turning or U-turning drivers are advised that a steady CIRCULAR YELLOW signal indication is not simultaneously being displayed to the opposing traffic if this operation occurs continuously by the installation near the left-most signal head of a W25-1 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC HAS EXTENDED GREEN; or</p> <p>(c) Drivers are advised of the operation if it occurs only occasionally, such as during a</p>	<p><b>to terminate a flashing left-turn (or U-turn to the left) YELLOW ARROW or a flashing left-turn (or U-turn to the left) RED ARROW signal indication in a signal face controlling a permissive left-turn (or U-turn to the left) movement as described in Sections 4D.18 and 4D.20 shall be permitted to be displayed when a CIRCULAR YELLOW signal indication is displayed for the opposing through movement. Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or raised channelization clearly indicate which departure lane to use.</b></p> <p><b>5. Shall not be displayed to terminate a flashing arrow signal indication on an approach from which drivers are turning left permissively or making a U-turn to the left permissively unless one of the following conditions exists:</b></p> <p><b>(a) A steady CIRCULAR YELLOW signal indication is also simultaneously being displayed to the opposing approach;</b></p> <p><b>(b) An engineering study has determined that, because of unique intersection conditions, the condition described in Item (a) cannot reasonably be implemented without causing significant operational or safety problems and that the volume of impacted left-turning or U-turning traffic is relatively low, and those left-turning or U-turning drivers are advised that a steady CIRCULAR YELLOW signal indication is not simultaneously being displayed to the opposing traffic if this operation occurs continuously by the installation near the left-most signal head of a W25-1 sign (see Section 2C.48) with the legend ONCOMING</b></p>	<p>controlling a permissive left-turn (or U-turn to the left) movement as described in Sections 4D.18 and 4D.20 shall be permitted to be displayed when a CIRCULAR YELLOW signal indication is displayed for the opposing through movement. Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or raised channelization clearly indicate which departure lane to use.</p> <p>5. Shall not be displayed to terminate a flashing arrow signal indication on an approach from which drivers are turning left permissively or making a U-turn to the left permissively unless one of the following conditions exists:</p> <p>(a) A steady CIRCULAR YELLOW signal indication is also simultaneously being displayed to the opposing approach;</p> <p>(b) An engineering study has determined that, because of unique intersection conditions, the condition described in Item (a) cannot reasonably be implemented without causing significant operational or safety problems and that the volume of impacted left-turning or U-turning traffic is relatively low, and those left-turning or U-turning drivers are advised that a steady CIRCULAR YELLOW signal indication is not simultaneously being displayed to the opposing traffic if this operation occurs continuously by the installation near the left-most signal head of a W25-1 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC HAS EXTENDED GREEN; or</p> <p>(c) Drivers are advised of the operation if it occurs only occasionally, such as during a preemption sequence, by the installation near</p>	
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<p>preemption sequence, by the installation near the left-most signal head of a W25-2 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN.</p> <p>6. Shall be terminated by a RED ARROW signal indication for the same direction or a CIRCULAR RED signal indication except:</p> <p>(a) When entering preemption operation, the <del>return to the previous</del> display of a GREEN ARROW signal indication or a flashing arrow signal indication shall be permitted following a steady YELLOW ARROW signal indication.</p> <p>(b) When the movement controlled by the arrow is to continue on a permissive mode basis during an immediately following CIRCULAR GREEN or flashing YELLOW ARROW signal indication.</p> <p>F. A steady GREEN ARROW signal indication:</p> <p>1. Shall be displayed only to allow vehicular movements, in the direction indicated, that are not in conflict with other vehicles moving on a green or yellow signal indication <del>or</del> and are not in conflict with pedestrians crossing in <del>conformance</del> compliance with a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication <del>(see Section 4D.9).</del> Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or</p>	<p><b>TRAFFIC HAS EXTENDED GREEN; or</b></p> <p><b>(c) Drivers are advised of the operation if it occurs only occasionally, such as during a preemption sequence, by the installation near the left-most signal head of a W25-2 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN.</b></p> <p><b>6. Shall be terminated by a RED ARROW signal indication for the same direction or a CIRCULAR RED signal indication except:</b></p> <p><b>(a) When entering preemption operation, the display of a GREEN ARROW signal indication or a flashing arrow signal indication shall be permitted following a steady YELLOW ARROW signal indication.</b></p> <p><b>(b) When the movement controlled by the arrow is to continue on a permissive mode basis during an immediately following CIRCULAR GREEN or flashing YELLOW ARROW signal indication.</b></p> <p><b>F. A steady GREEN ARROW signal indication:</b></p> <p><b>1. Shall be displayed only to allow vehicular movements, in the direction indicated, that are not in conflict with other vehicles moving on a green or yellow signal indication and are not in conflict with pedestrians crossing in compliance with a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication. Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic,</b></p>	<p>the left-most signal head of a W25-2 sign (see Section 2C.48) with the legend ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN.</p> <p>6. Shall be terminated by a RED ARROW signal indication for the same direction or a CIRCULAR RED signal indication except:</p> <p>(a) When entering preemption operation, the display of a GREEN ARROW signal indication or a flashing arrow signal indication shall be permitted following a steady YELLOW ARROW signal indication. (b) When the movement controlled by the arrow is to continue on a permissive mode basis during an immediately following CIRCULAR GREEN or flashing YELLOW ARROW signal indication.</p> <p>F. A steady GREEN ARROW signal indication:</p> <p>1. Shall be displayed only to allow vehicular movements, in the direction indicated, that are not in conflict with other vehicles moving on a green or yellow signal indication and are not in conflict with pedestrians crossing in compliance with a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication. Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or raised channelization clearly</p>	<p>Recommend changing text</p>
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<p>raised channelization clearly indicate which departure lane to use.</p> <p>2. Shall be displayed on a signal face that controls a left-turn movement when said movement is not in conflict with other vehicles moving on a green or yellow signal indication (except for the situation regarding U-turns provided in Paragraph 4) <del>or</del> and is not in conflict with pedestrians crossing in <del>conformance-</del> compliance with a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication (see Section 4D.09). Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or raised channelization clearly indicate which departure lane to use.</p> <p>3. Shall not be required on the stem of T-intersections or for turns from one-way streets.</p> <p>OPTION</p> <p><del>Steady RED ARROW, YELLOW ARROW, and GREEN ARROW signal indications, if not otherwise prohibited, may be used instead of the corresponding circular signal indications at the following locations:</del></p> <p><del>A. On an approach intersecting a one-way street;</del></p> <p><del>B. Where certain movements are prohibited; and</del></p> <p><del>C. Where certain movements are physically impossible.</del></p> <p>If U-turns are permitted from the approach and a right-turn GREEN ARROW signal indication is <del>if drivers making a right turn from the conflicting approach to the left are</del> simultaneously being <del>shown</del> displayed to road</p>	<p><b>there is a separate departing lane, and pavement markings or raised channelization clearly indicate which departure lane to use.</b></p> <p><b>2. Shall be displayed on a signal face that controls a left-turn movement when said movement is not in conflict with other vehicles moving on a green or yellow signal indication (except for the situation regarding U-turns provided in Paragraph 4) and is not in conflict with pedestrians crossing in compliance with a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication. Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or raised channelization clearly indicate which departure lane to use.</b></p> <p><b>3. Shall not be required on the stem of a T-intersection or for turns from a one-way street.</b></p> <p>Option:</p> <p>04 If U-turns are permitted from the approach and a right-turn GREEN ARROW signal indication is simultaneously being displayed to road users making a right turn from the conflicting approach to the left, road users making a U-turn may be advised of the operation by the installation near the left-turn signal face of a U-TURN YIELD TO RIGHT TURN (R10-16) sign (see Section 2B.53).</p> <p>05 If not otherwise prohibited, a steady straight-through green arrow signal indication may be used instead of a circular green signal indication in a signal face on an approach intersecting a one-way street to discourage</p>	<p>indicate which departure lane to use.</p> <p>2. Shall be displayed on a signal face that controls a left-turn movement when said movement is not in conflict with other vehicles moving on a green or yellow signal indication (except for the situation regarding U-turns provided in Paragraph 4 the Option below) and is not in conflict with pedestrians crossing in compliance with a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication. Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or raised channelization clearly indicate which departure lane to use.</p> <p>3. Shall not be required on the stem of T-intersections or for turns from one-way streets.</p> <p>OPTION</p> <p>If U-turns are permitted from the approach and a right-turn GREEN ARROW signal indication simultaneously being displayed to road users making a right turn from the conflicting approach to the left road users making a U-turn may be advised of the operation by the installation near the left-turn signal face of a U-TURN YIELD TO RIGHT TURN (R10-16) sign (see Section 2B.45).</p> <p>If not otherwise prohibited, a steady straight-through green arrow signal indication may be used instead of a circular green signal indication in a signal face on an approach intersecting a one-way street to discourage</p>	<p>See note below</p> <p><del>MnDOT Metro intends on using this sign. Committee has some concern and would like to add language discouraging it. Issue has been resolved</del></p>
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<p>users making a right turn from the conflicting approach to the left <del>a right turn GREEN ARROW signal indication, drivers</del> road users making a U-turn may be advised of the operation by the installation near the left-turn signal face of a U-TURN YIELD TO RIGHT TURN (R10-16) sign (see Section 2B.45).</p> <p>If not otherwise prohibited, a steady straight-through green arrow signal indication may be used instead of a circular green signal indication in a signal face on an approach intersecting a one-way street to discourage wrong-way turns.</p> <p>If not otherwise prohibited, steady red, yellow, and green turn arrow signal indications may be used instead of steady circular red, yellow, and green signal indications in a signal face on an approach where all traffic is required to turn or where the straight-through movement is not physically possible.</p> <p>Support: Section 4D.25 contains information regarding the signalization of approaches that have a shared left-turn/right-turn lane and no through movement.</p> <p>Standard: <del>H.</del> If supplemental signal faces are used, the following limitations shall apply:</p> <p><del>1.</del> A. Left-turn arrows and U-turn arrows to the left shall not be used in near-right signal faces.</p> <p><del>2.</del> B. Right-turn arrows and U-turn arrows to the right shall not be used in far-left signal faces. A far-side median-mounted signal face shall be considered a far-left signal for this application.</p>	<p>wrong-way turns.</p> <p>06 If not otherwise prohibited, steady red, yellow, and green turn arrow signal indications may be used instead of steady circular red, yellow, and green signal indications in a signal face on an approach where all traffic is required to turn or where the straight-through movement is not physically possible.</p> <p>Support: 07 Section 4D.25 contains information regarding the signalization of approaches that have a shared left-turn/right-turn lane and no through movement.</p> <p><b>Standard:</b> 08 <b>If supplemental signal faces are used, the following limitations shall apply:</b> <b>A. Left-turn arrows and U-turn arrows to the left shall not be used in near-right signal faces.</b> <b>B. Right-turn arrows and U-turn arrows to the right shall not be used in far-left signal faces. A far-side median-mounted signal face shall be considered a far-left signal for this</b></p>	<p>wrong-way turns.</p> <p>If not otherwise prohibited, steady red, yellow, and green turn arrow signal indications may be used instead of steady circular red, yellow, and green signal indications in a signal face on an approach where all traffic is required to turn or where the straight-through movement is not physically possible.</p> <p>Support: Section 4D.25 contains information regarding the signalization of approaches that have a shared left-turn/right-turn lane and no through movement.</p> <p>Standard: If supplemental signal faces are used, the following limitations shall apply:</p> <p>A. Left-turn arrows and U-turn arrows to the left shall not be used in near-right signal faces.</p> <p>B. Right-turn arrows and U-turn arrows to the right shall not be used in far-left signal faces. A far-side median-mounted signal face shall be considered a far-left signal for</p>	<p>Recommend adding language</p> <p>Recommend changing per fed manual</p> <p>Relocated from 4D.15</p>
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<p>A straight-through RED ARROW signal indication or a straight-through YELLOW ARROW signal indication shall not be displayed on any signal face, either alone or in combination with any other signal indication.</p> <p>The following combinations of signal indications shall not be simultaneously displayed on any one signal face:</p> <p><del>A. CIRCULAR GREEN with CIRCULAR YELLOW.</del></p> <p>A. CIRCULAR RED with CIRCULAR YELLOW.</p> <p>C. CIRCULAR GREEN with CIRCULAR RED; or</p> <p>D. Straight-through GREEN ARROW with CIRCULAR RED.</p> <p>Additionally, <del>the</del> the above combinations shall not be simultaneously displayed <del>in different signal faces on any one</del> an approach as a result of the combination of displays from multiple signal faces unless <del>one of the following conditions exists</del> the display is created by a signal face(s) devoted exclusively to the control of a right-turning movement and:</p> <p><del>B</del> A. The signal face(s) controlling the right-turning movement <del>are shielded, hooded, louvered, positioned, or designed</del> is visibility-limited from the adjacent through movement or positioned <del>so that the combination is not confusing</del> to minimize potential confusion to approaching road users;, or</p> <p><del>A. B. One of the signal faces is a turn signal controlling a protected only mode turn, and a</del> A LEFT-(RIGHT) TURN SIGNAL sign-(R10-10) sign (See Sections 4D.21 through 4D.24) <del>2B.45) (see Sections 4D.6 and 4D.7)</del> is mounted adjacent to <del>each such</del> the signal face(s) controlling the right-turning movement.</p>	<p><b>application.</b></p> <p><b>09 A straight-through RED ARROW signal indication or a straight-through YELLOW ARROW signal indication shall not be displayed on any signal face, either alone or in combination with any other signal indication.</b></p> <p><b>10 The following combinations of signal indications shall not be simultaneously displayed on any one signal face:</b></p> <p><b>A. CIRCULAR RED with CIRCULAR YELLOW;</b></p> <p><b>B. CIRCULAR GREEN with CIRCULAR RED; or</b></p> <p><b>C. Straight-through GREEN ARROW with CIRCULAR RED;</b></p> <p><b>11 Additionally, the above combinations shall not be simultaneously displayed on an approach as a result of the combination of displays from multiple signal faces unless the display is created by a signal face(s) devoted exclusively to the control of a right-turning movement and:</b></p> <p><b>A. The signal face(s) controlling the right-turning movement is visibility-limited from the adjacent through movement or positioned to minimize potential confusion to approaching road users, or</b></p> <p><b>B. A RIGHT TURN SIGNAL (R10-10) sign (see Sections 4D.21 through 4D.24) is mounted adjacent to the signal face(s) controlling the right-turning movement.</b></p>	<p>this application.</p> <p>A straight-through RED ARROW signal indication or a straight-through YELLOW ARROW signal indication shall not be displayed on any signal face, either alone or in combination with any other signal indication.</p> <p>The following combinations of signal indications shall not be simultaneously displayed on any one signal face:</p> <p>A. CIRCULAR RED with CIRCULAR YELLOW.</p> <p>C. CIRCULAR GREEN with CIRCULAR RED; or</p> <p>D. Straight-through GREEN ARROW with CIRCULAR RED.</p> <p>Additionally, the above combinations shall not be simultaneously displayed on an approach as a result of the combination of displays from multiple signal faces unless the display is created by a signal face(s) devoted exclusively to the control of a right-turning movement and:</p> <p>A. The signal face(s) controlling the right-turning movement is visibility-limited from the adjacent through movement or positioned- to minimize potential confusion to approaching road users;, or</p> <p>B. RIGHT TURN SIGNAL (R10-10) sign (See Sections 4D.21 through 4D.24) is mounted adjacent to the signal face(s) controlling the right-turning movement.</p>	<p>Relocated from section 4D.8</p>
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The following combinations of signal indications shall not be simultaneously displayed on any one signal face or as a result of the combination of displays from multiple signal faces on an approach:

- A. CIRCULAR GREEN with CIRCULAR YELLOW;
- B. Straight-through GREEN ARROW with CIRCULAR YELLOW;
- C. GREEN ARROW with YELLOW ARROW pointing in the same direction;
- D. RED ARROW with YELLOW ARROW pointing in the same direction; or
- E. GREEN ARROW with RED ARROW pointing in the same direction.

Except as otherwise provided in Sections 4F.03 and 4G.04, the same signal section shall not be used to display both a flashing yellow and a steady yellow indication during steady mode operation. Except as otherwise provided in Sections 4D.18, 4D.20, 4D.22, and 4D.24, the same signal section shall not be used to display both a flashing red and a steady red indication during steady mode operation.

~~A steady GREEN ARROW or YELLOW ARROW signal indication shall not be displayed to vehicular movements that are in conflict with the following:~~

- ~~A. Other vehicles moving on a green or yellow signal indication, except for the situation regarding U turns described in Section 4D.05. Vehicles departing in the same direction shall not be considered in conflict if, for each turn lane with moving traffic, there is a separate departing lane, and pavement markings or~~

**<sup>12</sup> The following combinations of signal indications shall not be simultaneously displayed on any one signal face or as a result of the combination of displays from multiple signal faces on an approach:**

- A. CIRCULAR GREEN with CIRCULAR YELLOW;**
- B. Straight-through GREEN ARROW with CIRCULAR YELLOW;**
- C. GREEN ARROW with YELLOW ARROW pointing in the same direction;**
- D. RED ARROW with YELLOW ARROW pointing in the same direction; or**
- E. GREEN ARROW with RED ARROW pointing in the same direction.**

**<sup>13</sup> Except as otherwise provided in Sections 4F.03 and 4G.04, the same signal section shall not be used to display both a flashing yellow and a steady yellow indication during steady mode operation. Except as otherwise provided in Sections 4D.18, 4D.20, 4D.22, and 4D.24, the same signal section shall not be used to display both a flashing red and a steady red indication during steady mode operation.**

The following combinations of signal indications shall not be simultaneously displayed on any one signal face or as a result of the combination of displays from multiple signal faces on an approach:

- A. CIRCULAR GREEN with CIRCULAR YELLOW;
- B. Straight-through GREEN ARROW with CIRCULAR YELLOW;
- C. GREEN ARROW with YELLOW ARROW pointing in the same direction;
- D. RED ARROW with YELLOW ARROW pointing in the same direction; or
- E. GREEN ARROW with RED ARROW pointing in the same direction.

Except as otherwise provided in Sections 4F.03 and 4G.04, the same signal section shall not be used to display both a flashing yellow and a steady yellow indication during steady mode operation. Except as otherwise provided in Sections 4D.18, 4D.20, 4D.22, and 4D.24, the same signal section shall not be used to display both a flashing red and a steady red indication during steady mode operation.

Relocated from Section 4.9 and deleted because now covered elsewhere

<p><del>raised channelization clearly indicate which departure lane to use.</del></p> <p><del>B. Pedestrians crossing in conformance with a WALKING PERSON (symbolizing WALK) or flashing UPRAISED HAND (symbolizing DONT WALK) signal indication.</del></p> <p><b>GUIDANCE</b></p> <p>No movement that creates an unexpected crossing of pathways of moving vehicles or pedestrians should be allowed during any green or yellow interval, except when all three of the following conditions are met:</p> <p>A. The movement involves only slight conflict, and</p> <p>B. Serious traffic delays are substantially reduced by permitting the conflicting movement, and</p> <p>C. Drivers and pedestrians subjected to the unexpected conflict are effectively warned thereof by a sign.</p> <p>Entire 4D.6 relocated</p> <p><del>4D.18</del> 4D.6 Signal Indications - Design, Illumination, and Color, of Signal Sections and Shape</p> <p><b>STANDARD</b></p> <p>Each signal indication, except those used for pedestrian signal heads and lane-use control signals, shall be circular or arrow.</p> <p>Letters or numbers (including those associated with countdown displays) shall not be</p>	<p><i>Guidance:</i></p> <p><i>14 No movement that creates an unexpected crossing of pathways of moving vehicles or pedestrians should be allowed during any green or yellow interval, except when all three of the following conditions are met:</i></p> <p><i>A. The movement involves only slight conflict, and</i></p> <p><i>B. Serious traffic delays are substantially reduced by permitting the conflicting movement, and</i></p> <p><i>C. Drivers and pedestrians subjected to the unexpected conflict are effectively warned thereof by a sign.</i></p> <p><b>Section 4D.06 Signal Indications – Design, Illumination, Color, and Shape</b></p> <p><b>Standard:</b></p> <p>01 <b>Each signal indication, except those used for pedestrian signal heads and lane-use control signals, shall be circular or arrow.</b></p> <p>02 <b>Letters or numbers (including those associated with countdown displays) shall</b></p>	<p><b>GUIDANCE</b></p> <p>No movement that creates an unexpected crossing of pathways of moving vehicles or pedestrians should be allowed during any green or yellow interval, except when all three of the following conditions are met:</p> <p>A. The movement involves only slight conflict, and</p> <p>B. Serious traffic delays are substantially reduced by permitting the conflicting movement, and</p> <p>C. Drivers and pedestrians subjected to the unexpected conflict are effectively warned thereof by a sign</p> <p>4D.6 Signal Indications - Design, Illumination, Color, and Shape</p> <p><b>STANDARD</b></p> <p>Each signal indication, except those used for pedestrian signal heads and lane-use control signals, shall be circular or arrow.</p>	<p>Relocated from Section 4D.9</p> <p>This section should take care of the U-turn and sign issue</p> <p>Recommend replacing per fed. manual</p> <p>Relocated from 4D.18</p>
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<p>displayed as part of a vehicular signal indication.</p> <p>Strobes shall not be used within or adjacent to any signal indication.</p> <p>Except for the flashing signal indications and the pre-emption confirmation lights that are expressly allowed by the provisions of this Chapter, flashing displays shall not be used within or adjacent to any signal indications.</p> <p><del>Each signal indication shall be independently illuminated.</del></p> <p>Each circular signal indication shall emit a single color: red, yellow, or green.</p> <p>Each arrow signal indication shall emit a single color: red, yellow, or green except that the alternate display (dual-arrow signal section) of a GREEN ARROW and a YELLOW ARROW signal indication, both pointing in the same direction, shall be permitted, provided that they are not displayed simultaneously.</p> <p>The arrow, which shall show only one direction, shall be the only illuminated part of an arrow signal indication.</p> <p>Arrows shall be pointed:</p> <p>A. Vertically upward to indicate a straight-through movement; , or</p> <p>B. Horizontally in the direction of the turn to indicate a turn at approximately or greater than a right angle; and-, or</p> <p>C. Upward with a slope at an angle approximately equal to that of the turn if the angle of the turn is substantially less than a right angle, or</p> <p>D. In a manner that directs the driver through the turn if a U-turn arrow is used</p>	<p><b>not be displayed as part of a vehicular signal indication.</b></p> <p><b>03 Strobes shall not be used within or adjacent to any signal indication.</b></p> <p><b>04 Except for the flashing signal indications and the pre-emption confirmation lights that are expressly allowed by the provisions of this Chapter, flashing displays shall not be used within or adjacent to any signal indications.</b></p> <p><b>05 Each circular signal indication shall emit a single color: red, yellow, or green.</b></p> <p><b>06 Each arrow signal indication shall emit a single color: red, yellow, or green except that the alternate display (dual-arrow signal section) of a GREEN ARROW and a YELLOW ARROW signal indication, both pointing in the same direction, shall be permitted, provided that they are not displayed simultaneously.</b></p> <p><b>07 The arrow, which shall show only one direction, shall be the only illuminated part of an arrow signal indication.</b></p> <p><b>08 Arrows shall be pointed:</b></p> <p><b>A. Vertically upward to indicate a straight-through movement, or</b></p> <p><b>B. Horizontally in the direction of the turn to indicate a turn at approximately or greater than a right angle, or</b></p> <p><b>C. Upward with a slope at an angle approximately equal to that of the turn if the angle of the turn is substantially less than a right angle, or</b></p> <p><b>D. In a manner that directs the driver</b></p>	<p>Letters or numbers (including those associated with countdown displays) shall not be displayed as part of a vehicular signal indication.</p> <p>Strobes shall not be used within or adjacent to any signal indication.</p> <p>Except for the flashing signal indications and the pre-emption confirmation lights that are expressly allowed by the provisions of this Chapter, flashing displays shall not be used within or adjacent to any signal indications.</p> <p>Each circular signal indication shall emit a single color: red, yellow, or green.</p> <p>Each arrow signal indication shall emit a single color: red, yellow, or green except that the alternate display (dual-arrow signal section) of a GREEN ARROW and a YELLOW ARROW signal indication, both pointing in the same direction, shall be permitted, provided that they are not displayed simultaneously.</p> <p>The arrow, which shall show only one direction, shall be the only illuminated part of an arrow signal indication.</p> <p>Arrows shall be pointed:</p> <p>A. Vertically upward to indicate a straight-through movement, or</p> <p>B. Horizontally in the direction of the turn to indicate a turn at approximately or greater than a right angle, or</p> <p>C. Upward with a slope at an angle approximately equal to that of the turn if the angle of the turn is substantially less than a right angle, or</p> <p>D. In a manner that directs the driver</p>	<p>Relocated from 4D.16</p>
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<p>(see Figure 4D-1)</p> <p>Except <del>for the requirements of this section, as provided in Paragraph 10</del>, the requirements of the publication entitled “<del>Standards for</del> Vehicle Traffic Control Signal Heads” (see Section 1A.11) that pertain to the aspects of the signal head design that affect the display of the signal indications shall be met.</p> <p><b>GUIDANCE</b></p> <p>The intensity and distribution of light from each illuminated signal lens should <del>conform to</del> comply with the <del>current</del> publications entitles “<del>Standards for</del> Vehicle Traffic Control Signal Heads” and “Traffic Signal Lamps” (see Section 1A.11).</p> <p><b>STANDARD</b></p> <p>References to signal lenses in this section shall not be used to limit signal optical units to incandescent lamps within optical assemblies that include lenses.</p> <p><b>SUPPORT</b></p> <p>Research has resulted in signal optical units that are not lenses, such as, but not limited to, light-emitting diode (LED) traffic signal modules. Some units are practical for all signal indications, and some are practical for specific types such as visibility-limited signal indications.</p> <p><b>GUIDANCE</b></p> <p>If a signal indication is <del>operated in the flashing mode for nighttime operation and the signal indication is</del> so bright <del>as to</del> that it causes excessive glare during nighttime conditions, some form of automatic dimming should be used to reduce the brilliance of the signal indication.</p>	<p>through the turn if a U-turn arrow is used (see Figure 4D-1).</p> <p><b>09 Except as provided in Paragraph 10, the requirements of the publication entitled “Vehicle Traffic Control Signal Heads” (see Section 1A.11) that pertain to the aspects of the signal head design that affect the display of the signal indications shall be met.</b></p> <p><i>Guidance:</i></p> <p><b>10 The intensity and distribution of light from each illuminated signal lens should comply with the publications entitled “Vehicle Traffic Control Signal Heads” and “Traffic Signal Lamps” (see Section 1A.11).</b></p> <p><b>Standard:</b></p> <p><b>11 References to signal lenses in this section shall not be used to limit signal optical units to incandescent lamps within optical assemblies that include lenses.</b></p> <p><i>Support:</i></p> <p><b>12 Research has resulted in signal optical units that are not lenses, such as, but not limited to, light emitting diode (LED) traffic signal modules. Some units are practical for all signal indications, and some are practical for specific types such as visibility-limited signal indications.</b></p> <p><i>Guidance:</i></p> <p><b>13 If a signal indication is so bright that it causes excessive glare during nighttime conditions, some form of automatic dimming should be used to reduce the brilliance of the signal indication.</b></p>	<p>through the turn if a U-turn arrow is used (see Figure 4D-1)</p> <p>Except as provided in <b>the guidance below</b>, the requirements of the publication entitled “Vehicle Traffic Control Signal Heads” (see Section 1A.11) that pertain to the aspects of the signal head design that affect the display of the signal indications shall be met.</p> <p><b>GUIDANCE</b></p> <p>The intensity and distribution of light from each illuminated signal lens should comply with the publications entitles “Vehicle Traffic Control Signal Heads” and “Traffic Signal Lamps” (see Section 1A.11).</p> <p><b>STANDARD</b></p> <p>References to signal lenses in this section shall not be used to limit signal optical units to incandescent lamps within optical assemblies that include lenses.</p> <p><b>SUPPORT</b></p> <p>Research has resulted in signal optical units that are not lenses, such as, but not limited to, light-emitting diode (LED) traffic signal modules. Some units are practical for all signal indications, and some are practical for specific types such as visibility-limited signal indications.</p> <p><b>GUIDANCE</b></p> <p>If a signal indication is so bright that it causes excessive glare during nighttime conditions, some form of automatic dimming should be used to reduce the brilliance of the signal indication.</p>	<p>Remove and replace paragraph reference</p> <p>Relocated from 4D.18</p>
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<p><del>4D.15 4D.7 Size, Number, and Location of Vehicular Signal Indications Faces by Approach</del></p> <p>STANDARD There shall be two nominal diameter sizes for vehicular signal <del>lenses indications</del>: 200 mm (8 in) and 300 mm (12 in).</p> <p><del>Except as provided in Paragraph 3 below, Three-hundred millimeter (12 in) signal lenses indications shall be used for all signal sections in all new signal faces.:</del></p> <p><del>A. For signal indications for approaches (see definition in Section 4A.02) where road users view both traffic control and lane use control signal heads simultaneously;</del></p> <p><del>B. If the nearest signal face is between 35 m (120 ft) and 45 m (150 ft) beyond the stop line, unless a supplemental near side signal face is provided;</del></p> <p><del>C. For signal faces located more than 45 m (150 ft) from the stop line;</del></p> <p><del>D. For approaches to all signalized locations for which the minimum sight distance in Table 4D-1 cannot be met; and</del></p> <p><del>E. For arrow signal indications.</del></p> <p><del>A 200 mm (8 in) signal lens for a CIRCULAR RED signal indication shall not be used in combination with a 300 mm (12 in) signal lens for a CIRCULAR GREEN signal indication or a 300 mm (12 in) signal lens for a CIRCULAR YELLOW signal indication.</del></p> <p>OPTION <del>Different sizes of signal lenses may be used in the same signal face or signal head, except for the prohibitions listed in the Standards in this Section.</del></p>	<p><b>Section 4D.07 Size of Vehicular Signal Indications Standard:</b></p> <p>01 <b>There shall be two nominal diameter sizes for vehicular signal indications: 8 inches and 12 inches.</b></p> <p>02 <b>Except as provided in Paragraph 3 below, 12-inch signal indications shall be used for all signal sections in all new signal faces.</b></p> <p>Option: 03 Eight-inch circular signal indications may be used in new signal faces only for: A. The green or flashing yellow signal</p>	<p>4D.7 Size-of Vehicular Signal Indications</p> <p>STANDARD There shall be two nominal diameter sizes for vehicular signal indications: 200 mm (8 in) and 300 mm (12 in).</p> <p>Except as provided below, Three-hundred millimeter (12 in) signal indications shall be used for all signal sections in all new signal faces.:</p> <p>OPTION Eight-inch circular signal indications may be</p>	<p>Relocated from 4D.15</p> <p>Recommend replacing per fed manual</p> <p>Remove reference to Paragraph</p>
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<p>Eight-inch circular signal indications may be used in new signal faces only for:</p> <p>A. The green or flashing yellow signal indications in an emergency-vehicle traffic control signal (see Section 4G.02);</p> <p>B. The circular indications in signal faces controlling the approach to the downstream location where two adjacent signalized locations are close to each other and it is not practical because of factors such as high approach speeds, horizontal or vertical curves, or other geometric factors to install visibility-limited signal faces for the downstream approach;</p> <p>C. The circular indications in a signal face that is located less than 120 feet from the stop line on a roadway with a posted or statutory speed limit of 30 mph or less;</p> <p>D. The circular indications in a supplemental near-side signal face;</p> <p>E. The circular indications in a supplemental signal face installed for the sole purpose of controlling pedestrian movements (see Section 4D.03) rather than vehicular movements; and</p> <p>F. The circular indications in a signal face installed for the sole purpose of controlling a bikeway or a bicycle movement.</p> <p>Existing 8-inch circular signal indications that are not included in Items A through F in Paragraph 3 may be retained for the remainder of their useful service life.</p> <p><b>GUIDANCE</b></p> <p><del>Three hundred millimeter (12 in) signal lenses should be used for all signal indications for the following:</del></p> <p><del>A. Approaches with 85<sup>th</sup> percentile approach speeds exceeding 60 km/h (40 mph);</del></p> <p><del>B. Approaches where a traffic control signal</del></p>	<p>indications in an emergency-vehicle traffic control signal (see Section 4G.02);</p> <p>B. The circular indications in signal faces controlling the approach to the downstream location where two adjacent signalized locations are close to each other and it is not practical because of factors such as high approach speeds, horizontal or vertical curves, or other geometric factors to install visibility-limited signal faces for the downstream approach;</p> <p>C. The circular indications in a signal face that is located less than 120 feet from the stop line on a roadway with a posted or statutory speed limit of 30 mph or less;</p> <p>D. The circular indications in a supplemental near-side signal face;</p> <p>E. The circular indications in a supplemental signal face installed for the sole purpose of controlling pedestrian movements (see Section 4D.03) rather than vehicular movements; and</p> <p>F. The circular indications in a signal face installed for the sole purpose of controlling a bikeway or a bicycle movement.</p> <p>04 Existing 8-inch circular signal indications that are not included in Items A through F in Paragraph 3 may be retained for the remainder of their useful service life.</p>	<p>used in new signal faces only for:</p> <p>A. The green or flashing yellow signal indications in an emergency-vehicle traffic control signal (see Section 4G.02);</p> <p>B. The circular indications in signal faces controlling the approach to the downstream location where two adjacent signalized locations are close to each other and it is not practical because of factors such as high approach speeds, horizontal or vertical curves, or other geometric factors to install visibility-limited signal faces for the downstream approach;</p> <p>C. The circular indications in a signal face that is located less than 120 feet from the stop line on a roadway with a posted or statutory speed limit of 30 mph or less;</p> <p>D. The circular indications in a supplemental near-side signal face;</p> <p>E. The circular indications in a supplemental signal face installed for the sole purpose of controlling pedestrian movements (see Section 4D.03) rather than vehicular movements; and</p> <p>F. The circular indications in a signal face installed for the sole purpose of controlling a bikeway or a bicycle movement.</p> <p>Existing 8-inch circular signal indications that are not included in Items A through F in Paragraph 3 may be retained for the remainder of their useful service life.</p>	
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<p><del>might be unexpected;</del>  <del>C. All approaches without curbs and gutters where only post-mounted signal heads are used; and D. Locations where there is a significant percentage of elderly drivers.</del></p> <p>4D.8 Positions of Signal Indications Within a Signal Face – General</p> <p>Support:  Standardization of the number and arrangements of signal sections in vehicular traffic control signal faces enables road users who are color vision deficient to identify the illuminated color by its position relative to other signal sections.</p> <p>STANDARD</p> <p>Unless otherwise provided in this Manual for a particular applications, <del>E</del>each signal face at a signalized location shall have three, four, or five signal sections. Unless otherwise provided in this Manual for a particular application, if vertical signal face includes a cluster (see Section 4D.9), the signal face shall have at least three vertical positions.</p> <p>A single-section signal face shall be permitted at a traffic control signal if it consists of a continuously <del>illuminated</del> displayed GREEN ARROW signal <del>lens</del> indication that is being used to indicate a continuous movement.</p> <p>The signal <del>lenses</del> sections in a signal face shall be arranged in a vertical or horizontal straight line, except <del>that in a vertical array, signal lenses of the same color may be arranged</del></p>	<p><b>Section 4D.08 Positions of Signal Indications Within a Signal Face – General</b></p> <p>Support:  01 Standardization of the number and arrangements of signal sections in vehicular traffic control signal faces enables road users who are color vision deficient to identify the illuminated color by its position relative to other signal sections.</p> <p><b>Standard:</b>  02 <b>Unless otherwise provided in this Manual for a particular application, each signal face at a signalized location shall have three, four, or five signal sections. Unless otherwise provided in this Manual for a particular application, if a vertical signal face includes a cluster (see Section 4D.09), the signal face shall have at least three vertical positions.</b></p> <p>03 <b>A single-section signal face shall be permitted at a traffic control signal if it consists of a continuously-displayed GREEN ARROW signal indication that is being used to indicate a continuous movement.</b></p> <p>04 <b>The signal sections in a signal face shall be arranged in a vertical or horizontal straight line, except as otherwise provided in Section 4D.09.</b></p>	<p>4D.8 Positions of Signal Indications Within a Signal Face – General</p> <p>Support:  Standardization of the number and arrangements of signal sections in vehicular traffic control signal faces enables road users who are color vision deficient to identify the illuminated color by its position relative to other signal sections.</p> <p>STANDARD</p> <p>Unless otherwise provided in this Manual for a particular applications, each signal face at a signalized location shall have three, four, or five signal sections. Unless otherwise provided in this Manual for a particular application, if vertical signal face includes a cluster (see Section 4D.9), the signal face shall have at least three vertical positions.</p> <p>A single-section signal face shall be permitted at a traffic control signal if it consists of a continuously-displayed GREEN ARROW signal indication that is being used to indicate a</p>	<p>Paragraphs relocated from 4D.16</p> <p>Parts of 4D.16 relocated to other sections</p> <p>Change per federal manual</p>
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<p><del>horizontally adjacent to each other at right angles to the basic straight line arrangement as otherwise provided in Section 4D.9</del></p> <p><del>C. If</del> The arrangement of adjacent signal indications sections in a signal face <del>are not identical, their arrangement</del> shall follow <del>Items A or B above</del> the relative positions listed in Sections 4D.9 or 4D.10, as applicable.</p> <p>If a signal section that displays a CIRCULAR YELLOW signal <del>lens</del> indication is used, it shall be located between the signal section that displays the red signal <del>lens or lenses</del> indication and all other signal <del>lenses</del> sections.</p> <p>If a U-turn arrow signal section is used in a signal face for a U-turn to the left, its position in the signal face shall be the same as stated in Sections 4D.9 and 4D.10 for a left-turn arrow signal section of the same color. If a U-turn arrow signal section is used in a signal face for a U-turn to the right, its position in the signal face shall be the same as stated in Sections 4D.9 and 4D.10 for a right-turn arrow signal section of the same color.</p> <p>A U-turn arrow signal indication pointing to the left shall not be used in a signal face that also contains a left-turn arrow signal indication. A U-turn arrow signal indication pointing to the right shall not be used in a signal face that also contains a right-turn arrow signal indication.</p> <p><b>OPTION</b></p> <p>Within a signal face, two identical CIRCULAR RED or RED ARROW signal indications may be displayed immediately horizontally adjacent to each other in a vertical or horizontal signal face (see Figure 4D-2) for emphasis.</p>	<p>05 <b>The arrangement of adjacent signal sections in a signal face shall follow the relative positions listed in Sections 4D.09 or 4D.10, as applicable.</b></p> <p>06 <b>If a signal section that displays a CIRCULAR YELLOW signal indication is used, it shall be located between the signal section that displays the red signal indication and all other signal sections.</b></p> <p>07 <b>If a U-turn arrow signal section is used in a signal face for a U-turn to the left, its position in the signal face shall be the same as stated in Sections 4D.09 and 4D.10 for a left-turn arrow signal section of the same color. If a U-turn arrow signal section is used in a signal face for a U-turn to the right, its position in the signal face shall be the same as stated in Sections 4D.09 and 4D.10 for a right-turn arrow signal section of the same color.</b></p> <p>08 <b>A U-turn arrow signal indication pointing to the left shall not be used in a signal face that also contains a left-turn arrow signal indication. A U-turn arrow signal indication pointing to the right shall not be used in a signal face that also contains a right-turn arrow signal indication.</b></p> <p>Option:</p> <p>09 Within a signal face, two identical CIRCULAR RED or RED ARROW signal indications may be displayed immediately horizontally adjacent to each other in a vertical or horizontal signal face (see Figure 4D-2) for emphasis.</p> <p>10 Horizontally-arranged and vertically-arranged signal faces may be used on the same approach provided they are separated to meet the lateral separation spacing required in Section 4D.13.</p> <p>Support:</p>	<p>continuous movement.</p> <p>The signal sections in a signal face shall be arranged in a vertical or horizontal straight line, except as otherwise provided in Section 4D.9.</p> <p>The arrangement of adjacent signal sections in a signal face shall follow the relative positions listed in Sections 4D.9 or 4D.10, as applicable.</p> <p>If a signal section that displays a CIRCULAR YELLOW signal indication is used, it shall be located between the signal section that displays the red signal indication and all other signal sections.</p> <p><b>If a U-turn arrow signal section is used in a signal face for a U-turn to the left, its position in the signal face shall be the same as stated in Sections 4D.9 and 4D.10 for a left-turn arrow signal section of the same color. If a U-turn arrow signal section is used in a signal face for a U-turn to the right, its position in the signal face shall be the same as stated in Sections 4D.9 and 4D.10 for a right-turn arrow signal section of the same color.</b></p> <p><b>A U-turn arrow signal indication pointing to the left shall not be used in a signal face that also contains a left-turn arrow signal indication. A U-turn arrow signal indication pointing to the right shall not be used in a signal face that also contains a right-turn arrow signal indication.</b></p> <p><b>OPTION</b></p> <p>Within a signal face, two identical CIRCULAR RED or RED ARROW signal indications may be displayed immediately horizontally adjacent to each other in a vertical or horizontal signal</p>	
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<p>Horizontally arranged and vertically arranged signal faces may be used on the same approach provided they are separated to meet the lateral separation spacing required in Section 4D.13+5.</p> <p>Support:</p> <p>Figure 4D-2-3 illustrates some of the possible typical arrangements of signal lenses sections in signal faces that do not control separate turning movements. Figures 4D-6 through 4D-12 illustrate the typical arrangements of signal sections in left-turn signal faces. Figures 4D-13 through 4D-19 illustrate the typical arrangements of signal sections in right-turn signal faces.</p> <p>4D.9 Positions of Signal Indications Within a Vertical Signal Face</p> <p><b>STANDARD</b></p> <p>In each vertically-arranged signal face, all signal sections that display red signal lenses indications in vertically-arranged signal faces shall be located above, and in horizontally arranged signal faces shall be located to the left, of all signal sections that display yellow and green signal lenses indications.</p> <p>In vertically arranged signal faces, each signal section that displays a YELLOW ARROW signal indication lens shall be located immediately above the signal section that displays a GREEN ARROW signal indication lens to which it applies.</p> <p>The relative positions of signal lenses sections within the signal face in a vertically-arranged signal face, from top to bottom, shall be as follows:</p>	<p>11 Figure 4D-2 illustrates some of the typical arrangements of signal sections in signal faces that do not control separate turning movements. Figures 4D-6 through 4D-12 illustrate the typical arrangements of signal sections in left-turn signal faces. Figures 4D-13 through 4D-19 illustrate the typical arrangements of signal sections in right-turn signal faces.</p> <p><b>Section 4D.09 Positions of Signal Indications Within a Vertical Signal Face</b></p> <p><b>Standard:</b></p> <p>01 In each vertically-arranged signal face, all signal sections that display red signal indications shall be located above all signal sections that display yellow and green signal indications.</p> <p>02 In vertically-arranged signal faces, each signal section that displays a YELLOW ARROW signal indication shall be located above the signal section that displays the GREEN ARROW signal indication to which it applies.</p> <p>03 The relative positions of signal sections in a vertically-arranged signal face, from top to bottom, shall be as follows:</p> <p><b>CIRCULAR RED</b>  <b>Steady and/or flashing left-turn RED ARROW</b></p>	<p>face (see Figure 4D-2) for emphasis.</p> <p>Horizontally arranged and vertically arranged signal faces may be used on the same approach provided they are separated to meet the lateral separation spacing required in Section 4D.13.</p> <p>Support:</p> <p>Figure 4D-2 illustrates some of the typical arrangements of signal sections in signal faces that do not control separate turning movements. Figures 4D-6 through 4D-12 illustrate the typical arrangements of signal sections in left-turn signal faces. Figures 4D-13 through 4D-19 illustrate the typical arrangements of signal sections in right-turn signal faces.</p> <p>4D.9 Positions of Signal Indications Within a Vertical Signal Face</p> <p><b>STANDARD</b></p> <p>In each vertically-arranged signal face, all signal sections that display red signal indications shall be located above-all signal sections that display yellow and green signal indications.</p> <p>In vertically arranged signal faces, each signal section that displays a YELLOW ARROW signal indication shall be located above the signal section that displays a GREEN ARROW signal indication to which it applies.</p> <p>The relative positions of signal sections in a vertically-arranged signal face, from top to bottom, shall be as follows:</p> <p><b>CIRCULAR RED</b>  <b>Steady and/or flashing left-turn RED ARROW</b>  <b>Steady and/or flashing right-turn RED</b></p>	<p>Paragraphs relocated from Section 4D.16</p> <p>Parts of 4D.16 relocated to other sections</p> <p>Change per federal manual</p>
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<p><del>A. In a vertically arranged signal face from top to bottom:</del></p> <p>CIRCULAR RED</p> <p>Steady and/or flashing <del>L</del>left-turn RED ARROW</p> <p>Steady and/or flashing <del>R</del>right-turn RED ARROW</p> <p>CIRCULAR YELLOW</p> <p>CIRCULAR GREEN</p> <p>Straight-through GREEN ARROW</p> <p>Steady Left-turn YELLOW ARROW</p> <p>Flashing left-turn YELLOW ARROW</p> <p>Left-turn GREEN ARROW</p> <p>Steady Right-turn YELLOW ARROW</p> <p>Flashing right-turn YELLOW ARROW</p> <p>Right-turn GREEN ARROW</p> <p>If a dual-arrow signal section (capable of alternating between the display of a GREEN ARROW and a YELLOW ARROW signal indication) is used, <del>in a vertically-arranged signal face, the lenses dual-arrow signal section shall be in occupy the same position relative to the other lenses sections as are the signal section that displays the GREEN ARROW signal lenses indication in a vertically arranged signal face would occupy.</del></p> <p>OPTION</p> <p>In a vertically arranged signal face, <del>identical signal sections that display signal indications of the same color may be repeated in adjacent horizontal locations within the same signal face.</del> arranged horizontally adjacent to each other at right angles to the basic straight line arrangement to form a clustered signal face (see Figures 4D-2, 4D-9, 4D-11, 4D-16, and 4D-18).</p> <p>Standard:</p>	<p><b>Steady and/or flashing right-turn RED ARROW</b></p> <p><b>CIRCULAR YELLOW</b></p> <p><b>CIRCULAR GREEN</b></p> <p><b>Straight-through GREEN ARROW</b></p> <p><b>Steady left-turn YELLOW ARROW</b></p> <p><b>Flashing left-turn YELLOW ARROW</b></p> <p><b>Left-turn GREEN ARROW</b></p> <p><b>Steady right-turn YELLOW ARROW</b></p> <p><b>Flashing right-turn YELLOW ARROW</b></p> <p><b>Right-turn GREEN ARROW</b></p> <p><b>04 If a dual-arrow signal section (capable of alternating between the display of a GREEN ARROW and a YELLOW ARROW signal indication) is used in a vertically-arranged signal face, the dual-arrow signal section shall occupy the same position relative to the other sections as the signal section that displays the GREEN ARROW signal indication in a vertically-arranged signal face would occupy.</b></p> <p>Option:</p> <p>05 In a vertically-arranged signal face, signal sections that display signal indications of the same color may be arranged horizontally adjacent to each other at right angles to the basic straight line arrangement to form a clustered signal face (see Figures 4D-2, 4D-9, 4D-11, 4D-16, and 4D-18).</p> <p><b>Standard:</b></p> <p>06 <b>Such clusters shall be limited to the following:</b></p>	<p>ARROW</p> <p>CIRCULAR YELLOW</p> <p>CIRCULAR GREEN</p> <p>Straight-through GREEN ARROW</p> <p>Steady Left-turn YELLOW ARROW</p> <p>Flashing left-turn YELLOW ARROW</p> <p>Left-turn GREEN ARROW</p> <p>Steady Right-turn YELLOW ARROW</p> <p>Flashing right-turn YELLOW ARROW</p> <p>Right-turn GREEN ARROW</p> <p>If a dual-arrow signal section (capable of alternating between the display of a GREEN ARROW and a YELLOW ARROW signal indication) is used, in a vertically-arranged signal face, the dual-arrow signal section shall occupy the same position relative to the other sections as the signal section that displays the GREEN ARROW signal indication in a vertically arranged signal face would occupy.</p> <p>OPTION</p> <p>In a vertically arranged signal face, signal sections that display signal indications of the same color may be arranged horizontally adjacent to each other at right angles to the basic straight line arrangement to form a clustered signal face (see Figures 4D-2, 4D-9, 4D-11, 4D-16, and 4D-18).</p> <p>Standard:</p> <p>Such clusters shall be limited to the following:</p>	
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<p>Such clusters shall be limited to the following:</p> <p>A: <del>Two</del> Two identical signal <del>lenses</del> sections,</p> <p>B: <del>or to two</del> Two or three different signal <del>lenses</del> sections that display signal indications of the same color, or</p> <p>C: For only the specific case described in Section 4D.25 (see Drawing B of Figure 4D-20), two signal sections, one of which displays a GREEN ARROW signal indication and the other of which displays a flashing YELLOW ARROW signal indication.</p> <p>The signal section that displays a flashing yellow signal indication during steady mode operation:</p> <p>A. Shall not be placed in the same vertical position as the signal section that displays a steady yellow signal indication, and</p> <p>B. Shall be placed below the signal section that displays a steady yellow signal indication.</p> <p>Support: Sections 4F.02 and 4G.04 contain exceptions to the provisions of this Section that are applicable to hybrid beacons.</p> <p>4D.10 Positions of Signal Indications Within a Horizontal Signal Face STANDARD In each horizontally-arranged signal face, all signal sections that display red signal indications shall be located to the left of all signal sections that display yellow and green signal indications</p> <p>In horizontally arranged signal faces, <del>the</del> each</p>	<p><b>A. Two identical signal sections,</b> <b>B. Two or three different signal sections that display signal indications of the same color, or</b> <b>C. For only the specific case described in Section 4D.25 (see Drawing B of Figure 4D-20), two signal sections, one of which displays a GREEN ARROW signal indication and the other of which displays a flashing YELLOW ARROW signal indication.</b></p> <p><b>07 The signal section that displays a flashing yellow signal indication during steady mode operation:</b> <b>A. Shall not be placed in the same vertical position as the signal section that displays a steady yellow signal indication, and</b> <b>B. Shall be placed below the signal section that displays a steady yellow signal indication.</b></p> <p>Support: 08 Sections 4F.02 and 4G.04 contain exceptions to the provisions of this Section that are applicable to hybrid beacons.</p> <p><b>Section 4D.10 Positions of Signal Indications Within a Horizontal Signal Face</b> <b>Standard:</b> 01 <b>In each horizontally-arranged signal face, all signal sections that display red signal indications shall be located to the left of all signal sections that display yellow and green signal indications.</b></p>	<p>A: Two identical signal sections, B: Two or three different signal sections that display signal indications of the same color, or C: For only the specific case described in Section 4D.25 (see Drawing B of Figure 4D-20), two signal sections, one of which displays a GREEN ARROW signal indication and the other of which displays a flashing YELLOW ARROW signal indication.</p> <p>The signal section that displays a flashing yellow signal indication during steady mode operation:</p> <p>A. Shall not be placed in the same vertical position as the signal section that displays a steady yellow signal indication, and B. Shall be placed below the signal section that displays a steady yellow signal indication.</p> <p>Support: Sections 4F.02 and 4G.04 contain exceptions to the provisions of this Section that are applicable to hybrid beacons.</p> <p>4D.10 Positions of Signal Indications Within a Horizontal Signal Face STANDARD In each horizontally-arranged signal face, all signal sections that display red signal indications shall be located to the left of all signal sections that display yellow and green signal indications</p>	<p>Paragraphs relocated from 4D.16</p> <p>Change per federal manual</p>
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<p>signal section that displays a YELLOW ARROW signal <del>lens</del> indication shall be located <del>immediately</del> to the left of the signal section that displays the GREEN ARROW signal <del>lens</del> indication to which it applies.</p> <p><del>B</del>. The relative positions of signal sections in <del>I</del>a horizontally arranged signal face, from left to right, shall be as follows:</p> <p>CIRCULAR RED  Steady and/or flashing <del>L</del>left-turn RED ARROW  Steady and/or flashing <del>R</del>right-turn RED ARROW  CIRCULAR YELLOW  Steady <del>L</del>left-turn YELLOW ARROW  Flashing left-turn YELLOW ARROW  Left-turn GREEN ARROW  CIRCULAR GREEN  Straight-through GREEN ARROW  Steady <del>R</del>right-turn YELLOW ARROW  Flashing right-turn YELLOW ARROW  Right-turn GREEN ARROW</p> <p>If a dual-arrow signal section (capable of alternating between the display of a GREEN ARROW and a YELLOW ARROW signal indication) is used in a horizontally-arranged signal face, the signal section that displays the dual left-turn arrow signal <del>lens</del>-indication shall be located immediately to the right of the signal section that displays the CIRCULAR YELLOW signal <del>lens</del> indication, the signal section that displays straight-through GREEN ARROW signal <del>lens</del> indication shall be located immediately to the right of the signal section that displays the CIRCULAR GREEN signal <del>lens</del> indication, and the signal section that displays the dual right-turn arrow signal <del>lens</del> indication shall be located to the right of all</p>	<p><b>02 In horizontally-arranged signal faces, each signal section that displays a YELLOW ARROW signal indication shall be located to the left of the signal section that displays the GREEN ARROW signal indication to which it applies.</b></p> <p><b>03 The relative positions of signal sections in a horizontally-arranged signal face, from left to right, shall be as follows:</b></p> <p><b>CIRCULAR RED  Steady and/or flashing left-turn RED ARROW  Steady and/or flashing right-turn RED ARROW  CIRCULAR YELLOW  Steady left-turn YELLOW ARROW  Flashing left-turn YELLOW ARROW  Left-turn GREEN ARROW  CIRCULAR GREEN  Straight-through GREEN ARROW  Steady right-turn YELLOW ARROW  Flashing right-turn YELLOW ARROW  Right-turn GREEN ARROW</b></p> <p><b>04 If a dual-arrow signal section (capable of alternating between the display of a GREEN ARROW and a YELLOW ARROW signal indication) is used in a horizontally-arranged signal face, the signal section that displays the dual left-turn arrow signal indication shall be located immediately to the right of the signal section that displays the CIRCULAR YELLOW signal indication, the signal section that displays the straight-through GREEN ARROW signal indication shall be located immediately to the right of the signal section that displays the CIRCULAR GREEN signal indication, and the signal section that displays the dual right-turn arrow signal indication shall be located to</b></p>	<p>In horizontally arranged signal faces, each signal section that displays a YELLOW ARROW signal indication shall be located to the left of the signal section that displays the GREEN ARROW signal indication to which it applies.</p> <p>The relative positions of signal sections in a horizontally arranged signal face, from left to right, shall be as follows:</p> <p>CIRCULAR RED  Steady and/or flashing left-turn RED ARROW  Steady and/or flashing right-turn RED ARROW  CIRCULAR YELLOW  Steady left-turn YELLOW ARROW  Flashing left-turn YELLOW ARROW  Left-turn GREEN ARROW  CIRCULAR GREEN  Straight-through GREEN ARROW  Steady right-turn YELLOW ARROW  Flashing right-turn YELLOW ARROW  Right-turn GREEN ARROW</p> <p>If a dual-arrow signal section (capable of alternating between the display of a GREEN ARROW and a YELLOW ARROW signal indication) is used in a horizontally-arranged signal face, the signal section that displays the dual left-turn arrow signal indication shall be located immediately to the right of the signal section that displays the CIRCULAR YELLOW signal indication, the signal section that displays straight-through GREEN ARROW signal indication shall be located immediately to the right of the signal section that displays the CIRCULAR GREEN signal indication, and the signal section that displays the dual right-turn arrow signal indication shall be located to the right of all other signal</p>	
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<p>other signal <del>lenses</del> sections.</p> <p>The signal section that displays a flashing yellow signal indication during steady mode operation:</p> <p>A. Shall not be placed in the same horizontal position as the signal section that displays a steady yellow signal indication, and</p> <p>B. Shall be placed to the right of the signal section that displays a steady yellow signal indication.</p> <p>Section 4D.11 Number of Signal Faces on an Approach</p> <p>STANDARD</p> <p>The signal faces for each approach to an intersection or a midblock location shall be provided as follows:</p> <p>A. If a signalized through movement exists on an approach, a <del>A</del> minimum of two primary signal faces shall be provided for the <del>major</del> through movement <del>on the approach, even if the major movement is a turning movement</del>. If a signalized through movement does not exist on an approach, a minimum of two primary signal faces shall be provided for the signalized turning movement that is considered to be the major movement from the approach (also see Section 4D.25).</p> <p>B. See Section 4D.17<del>6</del> through 4D.20 for left-turn (and U-turn to the left) signal faces.</p> <p>C. See Section 4D.21<del>7</del> through 4D.24 for right-turn (and U-turn to the right) signal faces.</p> <p>Option: Where a movement (or a certain lane or lanes) at the intersection never conflicts with any</p>	<p><b>the right of all other signal sections.</b></p> <p>05 <b>The signal section that displays a flashing yellow signal indication during steady mode operation:</b></p> <p><b>A. Shall not be placed in the same horizontal position as the signal section that displays a steady yellow signal indication, and</b></p> <p><b>B. Shall be placed to the right of the signal section that displays a steady yellow signal indication.</b></p> <p>Section 4D.11 Number of Signal Faces on an Approach</p> <p>Standard:</p> <p>01 <b>The signal faces for each approach to an intersection or a midblock location shall be provided as follows:</b></p> <p><b>A. If a signalized through movement exists on an approach, a minimum of two primary signal faces shall be provided for the through movement. If a signalized through movement does not exist on an approach, a minimum of two primary signal faces shall be provided for the signalized turning movement that is considered to be the major movement from the approach (also see Section 4D.25).</b></p> <p><b>B. See Sections 4D.17 through 4D.20 for left-turn (and U-turn to the left) signal faces.</b></p> <p><b>C. See Sections 4D.21 through 4D.24 for right-turn (and U-turn to the right) signal faces.</b></p> <p>Option: 02 Where a movement (or a certain lane or</p>	<p>sections.</p> <p>The signal section that displays a flashing yellow signal indication during steady mode operation:</p> <p>A. Shall not be placed in the same horizontal position as the signal section that displays a steady yellow signal indication, and</p> <p>B. Shall be placed to the right of the signal section that displays a steady yellow signal indication.</p> <p>Section 4D.11 Number of Signal Faces on an Approach</p> <p>STANDARD</p> <p>The signal faces for each approach to an intersection or a midblock location shall be provided as follows:</p> <p>A. If a signalized through movement exists on an approach, a minimum of two primary signal faces shall be provided for the through movement. If a signalized through movement does not exist on an approach, a minimum of two primary signal faces shall be provided for the signalized turning movement that is considered to be the major movement from the approach (also see Section 4D.25).</p> <p>B. See Section 4D.17 through 4D.20 for left-turn (and U-turn to the left) signal faces.</p> <p>C. See Section 4D.21 through 4D.24 for right-turn (and U-turn to the right) signal faces.</p> <p>Option: Where a movement (or a certain lane or lanes) at the intersection never conflicts with any other signalized vehicular or pedestrian movement, a continuously-displayed single-</p>	<p>Paragraphs relocated from 4D.15</p> <p>Recommend change per fed manual</p>
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<p>other signalized vehicular or pedestrian movement, a continuously-displayed single-section GREEN ARROW signal indication may be used to inform road users that the movement is free-flow and does not need to stop.</p> <p>Support: In some circumstances where the through movement never conflicts with any other signalized vehicular or pedestrian movement at the intersection, such as at T-intersections with appropriate geometrics and/or pavement markings and signing, an engineering study might determine that the through movement (or certain lanes of the through movement) can be free-flow and not signalized.</p> <p><b>GUIDANCE</b> If two or more left-turn lanes are provided for a separately controlled protected only mode left-turn movement, or if a left-turn movement represents the major movement from an approach, two or more primary left-turn signal faces should be provided. If two or more right-turn lanes are provided for a separately controlled right-turn movement, or if a right-turn movement represents the major movement from an approach, two or more primary right-turn signal faces should be provided.</p> <p>Support: Locating primary signal faces overhead on the far side of the intersection has been shown to provide safer operation by reducing intersection entries late in the yellow interval and by reducing red signal violations, as compared to post-mounting signal faces at the roadside or locating signal faces overhead</p>	<p>lanes) at the intersection never conflicts with any other signalized vehicular or pedestrian movement, a continuously-displayed single-section GREEN ARROW signal indication may be used to inform road users that the movement is free-flow and does not need to stop.</p> <p>Support: 03 In some circumstances where the through movement never conflicts with any other signalized vehicular or pedestrian movement at the intersection, such as at T-intersections with appropriate geometrics and/or pavement markings and signing, an engineering study might determine that the through movement (or certain lanes of the through movement) can be free-flow and not signalized.</p> <p><i>Guidance:</i> 04 <i>If two or more left-turn lanes are provided for a separately controlled protected only mode left-turn movement, or if a left-turn movement represents the major movement from an approach, two or more primary left-turn signal faces should be provided.</i> 05 <i>If two or more right-turn lanes are provided for a separately controlled right-turn movement, or if a right-turn movement represents the major movement from an approach, two or more primary right-turn signal faces should be provided.</i></p> <p>Support: 06 Locating primary signal faces overhead on the far side of the intersection has been shown to provide safer operation by reducing intersection entries late in the yellow interval and by reducing red signal violations, as compared to post-mounting signal faces at the</p>	<p>section GREEN ARROW signal indication may be used to inform road users that the movement is free-flow and does not need to stop.</p> <p>Support: In some circumstances where the through movement never conflicts with any other signalized vehicular or pedestrian movement at the intersection, such as at T-intersections with appropriate geometrics and/or pavement markings and signing, an engineering study might determine that the through movement (or certain lanes of the through movement) can be free-flow and not signalized.</p> <p><b>GUIDANCE</b> If two or more left-turn lanes are provided for a separately controlled protected only mode left-turn movement, or if a left-turn movement represents the major movement from an approach, two or more primary left-turn signal faces should be provided. If two or more right-turn lanes are provided for a separately controlled right-turn movement, or if a right-turn movement represents the major movement from an approach, two or more primary right-turn signal faces should be provided.</p> <p>Support: Locating primary signal faces overhead on the far side of the intersection has been shown to provide safer operation by reducing intersection entries late in the yellow interval and by reducing red signal violations, as compared to post-mounting signal faces at the roadside or locating signal faces overhead within the intersection on a diagonally-oriented mast arm or span wire. On approaches with</p>	
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<p>within the intersection on a diagonally-oriented mast arm or span wire. On approaches with two or more lanes for the through movement, one signal face per through lane, centered over each through lane, has also been shown to provide safer operation.</p> <p>Guidance: If the posted or statutory speed limit or the 85th-percentile speed on an approach to a signalized location is 45 mph or higher, signal faces should be provided as follows for all new or reconstructed signal installations (see Figure 4D-3):</p> <p>A. The minimum number and location of primary (non-supplemental) signal faces for through traffic should be provided in accordance with Table 4D-1.</p> <p>B. If the number of overhead primary signal faces for through traffic is equal to the number of through lanes on an approach, one overhead signal face should be located approximately over the center of each through lane.</p> <p>C. Except for shared left-turn and right-turn signal faces, any primary signal face required by Sections 4D.17 through 4D.25 for an exclusive turn lane should be located overhead approximately over the center of each exclusive turn lane.</p> <p>D. All primary signal faces should be located on the far side of the intersection.</p> <p>E. In addition to the primary signal faces, one or more supplemental pole-mounted or overhead signal faces should be considered to provide added visibility for approaching traffic that is traveling behind large vehicles.</p> <p>F. All signal faces should have backplates.</p> <p>This layout of signal faces should also be considered for any major urban or suburban</p>	<p>roadside or locating signal faces overhead within the intersection on a diagonally-oriented mast arm or span wire. On approaches with two or more lanes for the through movement, one signal face per through lane, centered over each through lane, has also been shown to provide safer operation.</p> <p>Guidance: <i>07 If the posted or statutory speed limit or the 85th-percentile speed on an approach to a signalized location is 45 mph or higher, signal faces should be provided as follows for all new or reconstructed signal installations (see Figure 4D-3):</i></p> <p><i>A. The minimum number and location of primary (non-supplemental) signal faces for through traffic should be provided in accordance with Table 4D-1.</i></p> <p><i>B. If the number of overhead primary signal faces for through traffic is equal to the number of through lanes on an approach, one overhead signal face should be located approximately over the center of each through lane.</i></p> <p><i>C. Except for shared left-turn and right-turn signal faces, any primary signal face required by Sections 4D.17 through 4D.25 for an exclusive turn lane should be located overhead approximately over the center of each exclusive turn lane.</i></p> <p><i>D. All primary signal faces should be located on the far side of the intersection.</i></p> <p><i>E. In addition to the primary signal faces, one or more supplemental pole-mounted or overhead signal faces should be considered to provide added visibility for approaching traffic that is traveling behind large vehicles.</i></p> <p><i>F. All signal faces should have backplates.</i></p> <p><i>08 This layout of signal faces should also be considered for any major urban or suburban arterial street with four or more lanes and for</i></p>	<p>two or more lanes for the through movement, one signal face per through lane, centered over each through lane, has also been shown to provide safer operation.</p> <p>Guidance: If the posted or statutory speed limit or the 85th-percentile speed on an approach to a signalized location is 45 mph or higher, signal faces should be provided as follows for all new or reconstructed signal installations (see Figure 4D-3):</p> <p>A. The minimum number and location of primary (non-supplemental) signal faces for through traffic should be provided in accordance with Table 4D-1.</p> <p>B. If the number of overhead primary signal faces for through traffic is equal to the number of through lanes on an approach, one overhead signal face should be located approximately over the center of each through lane.</p> <p>C. Except for shared left-turn and right-turn signal faces, any primary signal face required by Sections 4D.17 through 4D.25 for an exclusive turn lane should be located overhead approximately over the center of each exclusive turn lane.</p> <p>D. All primary signal faces should be located on the far side of the intersection.</p> <p>E. In addition to the primary signal faces, one or more supplemental pole-mounted or overhead signal faces should be considered to provide added visibility for approaching traffic that is traveling behind large vehicles.</p> <p>F. All signal faces should have backplates.</p> <p>This layout of signal faces should also be considered for any major urban or suburban arterial street with four or more lanes and for other approaches with speeds of less than 45</p>	
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<p>arterial street with four or more lanes and for other approaches with speeds of less than 45 mph.</p> <p><b>Section 4D.12 Visibility, Aiming, and Shielding of Signal Faces</b></p> <p><b>STANDARD</b> The primary consideration in signal face placement, aiming, and adjustment shall be to optimize the visibility of signal indications to approaching traffic.</p> <p>Road users approaching a signalized intersection or other signalized area, such as a midblock crosswalk, shall be given a clear and unmistakable indication of their right-of-way assignment.</p> <p>The geometry of each intersection to be signalized, including vertical grades, horizontal curves, and obstructions as well as the lateral and vertical angles of sight toward a signal face, as determined by typical driver-eye position, shall be considered in determining the vertical, longitudinal, and lateral position of the signal face.</p> <p><b>GUIDANCE</b> The two primary signal faces required as a minimum for each approach should be continuously visible to traffic approaching the traffic control signal, from a point at least the minimum sight distance indicated provided in Table 4D-1 in advance of and measured to the stop line. This range of continuous visibility should be provided unless precluded by a physical obstruction or unless another signalized location is within this range.</p>	<p><i>other approaches with speeds of less than 45 mph.</i></p> <p><b>Section 4D.12 Visibility, Aiming, and Shielding of Signal Faces</b> <b>Standard:</b> 01 <b>The primary consideration in signal face placement, aiming, and adjustment shall be to optimize the visibility of signal indications to approaching traffic.</b> 02 <b>Road users approaching a signalized intersection or other signalized area, such as a midblock crosswalk, shall be given a clear and unmistakable indication of their right-of-way assignment.</b> 03 <b>The geometry of each intersection to be signalized, including vertical grades, horizontal curves, and obstructions as well as the lateral and vertical angles of sight toward a signal face, as determined by typical driver-eye position, shall be considered in determining the vertical, longitudinal, and lateral position of the signal face.</b></p> <p><i>Guidance:</i> 04 <i>The two primary signal faces required as a minimum for each approach should be continuously visible to traffic approaching the traffic control signal, from a point at least the minimum sight distance provided in Table 4D-2 in advance of and measured to the stop line. This range of continuous visibility should be provided unless precluded by a physical obstruction or unless another signalized location is within this range.</i></p>	<p>mph.</p> <p>Section 4D.12 Visibility, Aiming, and Shielding of Signal Faces</p> <p><b>STANDARD</b> The primary consideration in signal face placement, aiming, and adjustment shall be to optimize the visibility of signal indications to approaching traffic.</p> <p>Road users approaching a signalized intersection or other signalized area, such as a midblock crosswalk, shall be given a clear and unmistakable indication of their right-of-way assignment.</p> <p>The geometry of each intersection to be signalized, including vertical grades, horizontal curves, and obstructions as well as the lateral and vertical angles of sight toward a signal face, as determined by typical driver-eye position, shall be considered in determining the vertical, longitudinal, and lateral position of the signal face.</p> <p><b>GUIDANCE</b> The two primary signal faces required as a minimum for each approach should be continuously visible to traffic approaching the traffic control signal, from a point at least the minimum sight distance provided in Table 4D-1 in advance of and measured to the stop line. This range of continuous visibility should be provided unless precluded by a physical obstruction or unless another signalized</p>	<p>Paragraphs relocated from Sections 4D.17, 4D.15 and 4D.18 throughout this section</p> <p>Recommend changing per fed manual</p>
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<p>There should be legal authority to prohibit the display of any unauthorized sign, signal, marking, or device that interferes with the effectiveness of any official traffic control device (see Section 11-205 of the “Uniform Vehicle Code”).</p> <p>At signalized midblock crosswalks, at least one of the signal faces should be over the traveled way for each approach.</p> <p><b>STANDARD</b>  <del>E.</del> If approaching traffic does not have a continuous view of at least two signal faces for at least the minimum sight distance shown in Table 4D-2, a sign (see Section 2C.36) shall be installed to warn approaching traffic of the traffic control signal.</p> <p><b>OPTION:</b>  If a sign is installed to warn approaching road users of the traffic control signal, the sign may be supplemented by a Warning Beacon (see Section 4L.3).</p> <p>A Warning Beacon used in this manner may be interconnected with the traffic signal controller assembly in such a manner as to flash yellow during the period when road users passing this beacon at the legal speed for the roadway might encounter a red signal indication (or a queue resulting from the display of the red signal indication) upon arrival at the signalized location (See Chapter 4M).</p> <p>If the sight distance to the <del>signal heads facing the faces for an</del> approach is limited by horizontal or vertical alignment, supplemental signal faces aimed at a point on the approach at</p>	<p><i>05 There should be legal authority to prohibit the display of any unauthorized sign, signal, marking, or device that interferes with the effectiveness of any official traffic control device (see Section 11-205 of the “Uniform Vehicle Code”).</i></p> <p><i>06 At signalized midblock crosswalks, at least one of the signal faces should be over the traveled way for each approach.</i></p> <p><b>Standard:</b>  <b>07 If approaching traffic does not have a continuous view of at least two signal faces for at least the minimum sight distance shown in Table 4D-2, a sign (see Section 2C.36) shall be installed to warn approaching traffic of the traffic control signal.</b></p> <p><b>Option:</b>  08 If a sign is installed to warn approaching road users of the traffic control signal, the sign may be supplemented by a Warning Beacon (see Section 4L.03).</p> <p>09 A Warning Beacon used in this manner may be interconnected with the traffic signal controller assembly in such a manner as to flash yellow during the period when road users passing this beacon at the legal speed for the roadway might encounter a red signal indication (or a queue resulting from the display of the red signal indication) upon arrival at the signalized location.</p> <p>10 If the sight distance to the signal faces for an approach is limited by horizontal or vertical alignment, supplemental signal faces aimed at</p>	<p>location is within this range.</p> <p>There should be legal authority to prohibit the display of any unauthorized sign, signal, marking, or device that interferes with the effectiveness of any official traffic control device (see Section 11-205 of the “Uniform Vehicle Code”).</p> <p>At signalized midblock crosswalks, at least one of the signal faces should be over the traveled way for each approach.</p> <p><b>STANDARD</b>  If approaching traffic does not have a continuous view of at least two signal faces for at least the minimum sight distance shown in Table 4D-2, a sign (see Section 2C.36) shall be installed to warn approaching traffic of the traffic control signal.</p> <p><b>OPTION:</b>  If a sign is installed to warn approaching road users of the traffic control signal, the sign may be supplemented by a Warning Beacon (see Section 4L.3).</p> <p>A Warning Beacon used in this manner may be interconnected with the traffic signal controller assembly in such a manner as to flash yellow during the period when road users passing this beacon at the legal speed for the roadway might encounter a red signal indication (or a queue resulting from the display of the red signal indication) upon arrival at the signalized location.</p> <p>If the sight distance to faces for an approach is limited by horizontal or vertical alignment, supplemental signal faces aimed at a point on</p>	
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<p>which the signal indications first become visible may be used.</p> <p><b>GUIDANCE</b> Supplemental signal faces should be used if engineering judgment has shown that they are needed to achieve intersection visibility both in advance and immediately before the signalized location.</p> <p>If supplemental signal faces are used, they should be located to provide optimum visibility for the movement to be controlled.</p> <p><b>STANDARD</b> In cases where irregular street design necessitates placing signal faces for different street approaches with a comparatively small angle between their respective signal <del>lenses</del> <b>indications</b>, each signal <del>lens</del> <b>indication</b> shall, to the extent practical, be <del>shielded or directed</del> <b>visibility-limited</b> by signal visors, signal louvers, or other means so that an approaching road user's <del>can see only view of</del> the signal <del>lens(es)</del> <b>indication(s)</b> controlling <del>the</del> movements on <del>the road user's other</del> approaches <del>is minimized</del>.</p> <p>Signal visors exceeding 300 mm (12 in) in length shall not be used on free-swinging signal <del>heads</del> <b>faces</b>.</p> <p><b>GUIDANCE</b> Signal visors should be used on signal faces to aid in directing the signal indication specifically to approaching traffic, as well as to reduce "sun phantom," which can result when external light enters the lens.</p> <p>The use of signal visors, or the use of signal faces or devices that direct the light without a</p>	<p>a point on the approach at which the signal indications first become visible may be used.</p> <p><i>Guidance:</i> 11 <i>Supplemental signal faces should be used if engineering judgment has shown that they are needed to achieve intersection visibility both in advance and immediately before the signalized location.</i></p> <p>12 <i>If supplemental signal faces are used, they should be located to provide optimum visibility for the movement to be controlled.</i></p> <p><b>Standard:</b> 13 <b>In cases where irregular street design necessitates placing signal faces for different street approaches with a comparatively small angle between their respective signal indications, each signal indication shall, to the extent practical, be visibility-limited by signal visors, signal louvers, or other means so that an approaching road user's view of the signal indication(s) controlling movements on other approaches is minimized.</b></p> <p>14 <b>Signal visors exceeding 12 inches in length shall not be used on free-swinging signal faces.</b></p> <p><i>Guidance:</i> 15 <i>Signal visors should be used on signal faces to aid in directing the signal indication specifically to approaching traffic, as well as to reduce "sun phantom," which can result when external light enters the lens.</i></p> <p>16 <i>The use of signal visors, or the use of signal faces or devices that direct the light without a</i></p>	<p>the approach at which the signal indications first become visible may be used.</p> <p><b>GUIDANCE</b> Supplemental signal faces should be used if engineering judgment has shown that they are needed to achieve intersection visibility both in advance and immediately before the signalized location.</p> <p>If supplemental signal faces are used, they should be located to provide optimum visibility for the movement to be controlled.</p> <p><b>STANDARD</b> In cases where irregular street design necessitates placing signal faces for different street approaches with a comparatively small angle between their respective signal indications, each signal indication shall, to the extent practical, be visibility-limited by signal visors, signal louvers, or other means so that an approaching road user's view of the signal indication(s) controlling movements other approaches is minimized.</p> <p>Signal visors exceeding 300 mm (12 in) in length shall not be used on free-swinging signal faces.</p> <p><b>GUIDANCE</b> Signal visors should be used on signal faces to aid in directing the signal indication specifically to approaching traffic, as well as to reduce "sun phantom," which can result when external light enters the <del>lens</del> indication.</p> <p>The use of signal visors, or the use of signal faces or devices that direct the light without a reduction in intensity, should be considered as an alternative to signal louvers because of the</p>	<p>Change lens to indication to match other changes</p>
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<p>reduction in intensity, should be considered as an alternative to signal louvers because of the reduction in light output caused by signal louvers.</p> <p><b>OPTION:</b> Special signal faces, such as visibility-limited signal faces, may be used such that the road user does not see signal indications intended for other approaches before seeing the signal indications for their own approach, if simultaneous viewing of both signal indications could cause the road user to be misdirected.</p> <p><b>GUIDANCE</b> If the posted or statutory speed limit or the 85<sup>th</sup> – percentile speed on an approach to a signalized location is 45 mph or higher, signal backplates should be used on all of the signal faces that face the approach. <del>A s</del>Signal backplates <del>for target value enhancement</del> should also be considered for use <del>used</del> on signal faces <del>viewed against a</del> on approaches with posted or statutory speed limits or 85<sup>th</sup>-percentile speeds of less than 45 mph where sun glare, bright sky <del>or bright</del> and/or complex or confusing backgrounds indicate a need for enhanced signal face target value.</p> <p><b>SUPPORT</b> The use of backplates enhances the contrast between the traffic signal indications and their surroundings for both day and night conditions, which is also helpful to <del>elderly</del> older drivers.</p> <p><b>STANDARD</b> The inside of signal visors (hoods), the entire surface of louvers and fins, and the front surface of backplates shall have a dull black finish to minimize light reflection and to increase contrast between the signal indication</p>	<p><i>reduction in intensity, should be considered as an alternative to signal louvers because of the reduction in light output caused by signal louvers.</i></p> <p><b>Option:</b> 17 Special signal faces, such as visibility-limited signal faces, may be used such that the road user does not see signal indications intended for other approaches before seeing the signal indications for their own approach, if simultaneous viewing of both signal indications could cause the road user to be misdirected.</p> <p><i>Guidance:</i> 18 <i>If the posted or statutory speed limit or the 85th-percentile speed on an approach to a signalized location is 45 mph or higher, signal backplates should be used on all of the signal faces that face the approach. Signal backplates should also be considered for use on signal faces on approaches with posted or statutory speed limits or 85th-percentile speeds of less than 45 mph where sun glare, bright sky, and/or complex or confusing backgrounds indicate a need for enhanced signal face target value.</i></p> <p><b>Support:</b> 19 The use of backplates enhances the contrast between the traffic signal indications and their surroundings for both day and night conditions, which is also helpful to older drivers.</p> <p><b>Standard:</b> 20 <b>The inside of signal visors (hoods), the entire surface of louvers and fins, and the front surface of backplates shall have a dull black finish to minimize light reflection and to increase contrast between the signal indication and its background.</b></p>	<p>reduction in light output caused by signal louvers.</p> <p><b>OPTION:</b> Special signal faces, such as visibility-limited signal faces, may be used such that the road user does not see signal indications intended for other approaches before seeing the signal indications for their own approach, if simultaneous viewing of both signal indications could cause the road user to be misdirected.</p> <p><b>GUIDANCE</b> If the posted or statutory speed limit or the 85<sup>th</sup> – percentile speed on an approach to a signalized location is 45 mph or higher, signal backplates should be used on all of the signal faces that face the approach. Signal backplates should also be considered for use on signal faces on approaches with posted or statutory speed limits or 85<sup>th</sup>-percentile speeds of less than 45 mph where sun glare, bright sky and/or complex or confusing backgrounds indicate a need for enhanced signal face target value.</p> <p><b>SUPPORT</b> The use of backplates enhances the contrast between the traffic signal indications and their surroundings for both day and night conditions, which is also helpful to older drivers.</p> <p><b>STANDARD</b> The inside of signal visors (hoods), the entire surface of louvers and fins, and the front surface of backplates shall have a dull black finish to minimize light reflection and to increase contrast between the signal indication and its background.</p> <p><b>Option:</b> A yellow retroreflective strip with a minimum</p>	<p>Previous guidance in Mn manual was stronger, but didn't show as Mn language</p>
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<p>and its background.</p> <p>Option: A yellow retroreflective strip with a minimum width of 1 inch and a maximum width of 3 inches may be placed along the perimeter of the face of a signal backplate to project a rectangular appearance at night.</p> <p>Section 4D.13 Lateral Positioning of Signal Faces</p> <p>Standard: <del>4-</del> At least one and preferably both of the minimum of two primary signal faces required by Item A in this Standard for the through movement (or the major turning movement if there is no through movement) on the approach shall be located between two lines intersecting with the center of the approach at a point 3 m (10 ft) behind the stop line, one making an angle of approximately 20 degrees to the right of the center of the approach extended, and the other making an angle of approximately 20 degrees to the left of the center of the approach extended (see Figure 4D-2)–The signal face that satisfies this requirement shall simultaneously satisfy the longitudinal placement requirement described in Section 4D.14 (see Figure 4D-4).</p> <p><del>5-</del> If both of the minimum of two primary signal faces required by Item A in this Standard for the through movement (or the major turning movement if there is not through movement) on the approach are post-mounted, they shall both be on the far side of the intersection, one on the right and one on the</p>	<p>Option: 21 A yellow retroreflective strip with a minimum width of 1 inch and a maximum width of 3 inches may be placed along the perimeter of the face of a signal backplate to project a rectangular appearance at night.</p> <p><b>Section 4D.13 Lateral Positioning of Signal Faces</b></p> <p><b>Standard:</b> 01 <b>At least one and preferably both of the minimum of two primary signal faces required for the through movement (or the major turning movement if there is no through movement) on the approach shall be located between two lines intersecting with the center of the approach at a point 10 feet behind the stop line, one making an angle of approximately 20 degrees to the right of the center of the approach extended, and the other making an angle of approximately 20 degrees to the left of the center of the approach extended. The signal face that satisfies this requirement shall simultaneously satisfy the longitudinal placement requirement described in Section 4D.14 (see Figure 4D-4).</b></p> <p>02 <b>If both of the minimum of two primary signal faces required for the through movement (or the major turning movement if there is no through movement) on the approach are post-mounted, they shall both be on the far side of the intersection, one on</b></p>	<p>width of 1 inch and a maximum width of 3 inches may be placed along the perimeter of the face of a signal backplate to project a rectangular appearance at night..</p> <p>Section 4D.13 Lateral Positioning of Signal Faces</p> <p>Standard: At least one and preferably both of the minimum of two primary signal faces required for the through movement (or the major turning movement if there is no through movement) on the approach shall be located between two lines intersecting with the center of the approach at a point 3 m (10 ft) behind the stop line, one making an angle of approximately 20 degrees to the right of the center of the approach extended, and the other making an angle of approximately 20 degrees to the left of the center of the approach extended The signal face that satisfies this requirement shall simultaneously satisfy the longitudinal placement requirement described in Section 4D.14 (see Figure 4D-4).</p> <p>If both of the minimum of two primary signal faces required for the through movement (or the major turning movement if there is not through movement) on the approach are post-mounted, they shall both be on the far side of the intersection, one on the right and one on the left of the approach lane(s).</p>	<p>Relocated from 4D.15</p> <p>Recommend changing per Fed manual</p>
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<p>left of the approach lane(s).  <b>F.</b> The <del>R</del>required signal faces for through traffic on <del>any one</del> an approach shall be located not less than 2.4 m (8 ft) apart measured horizontally perpendicular to the approach between the centers of the signal faces.  <b>G.</b> If more than one <del>separate</del> turn signal face is provided for a <del>protected mode</del> turning movement and if one or both of the <del>separate</del> turn signal faces are located over the roadway, the signal faces shall be located not less than 2.4 m (8 ft) apart measured horizontally perpendicular to the approach between the centers of the signal faces.</p> <p>Guidance:  If a signal face controls a specific lane or lanes of an approach, its position should make it readily visible to road users making that movement.</p> <p>Support:  Section 4D.11 contains additional provisions regarding lateral positioning of signal faces for approaches having a posted or statutory speed limit or an 85th-percentile speed of 45 mph or higher.</p> <p>Standard:  If an exclusive left-turn, right-turn, or U-turn lane is present on an approach and if a primary separate turn signal face controlling that lane is mounted over the roadway, the primary separate turn signal face shall not be positioned any further to the right than the extension of the right-hand edge of the exclusive turn lane or any further to the left than the extension of the left-hand edge of the exclusive turn lane.</p> <p>Supplemental turn signal faces mounted over the roadway shall not be subject to the</p>	<p><b>the right and one on the left of the approach lane(s).</b></p> <p><b>03 The required signal faces for through traffic on an approach shall be located not less than 8 feet apart measured horizontally perpendicular to the approach between the centers of the signal faces.</b></p> <p><b>04 If more than one separate turn signal face is provided for a turning movement and if one or both of the separate turn signal faces are located over the roadway, the signal faces shall be located not less than 8 feet apart measured horizontally perpendicular to the approach between the centers of the signal faces.</b></p> <p>Guidance:  <i>05 If a signal face controls a specific lane or lanes of an approach, its position should make it readily visible to road users making that movement.</i></p> <p>Support:  06 Section 4D.11 contains additional provisions regarding lateral positioning of signal faces for approaches having a posted or statutory speed limit or an 85th-percentile speed of 45 mph or higher.</p> <p><b>Standard:</b></p> <p><b>07 If an exclusive left-turn, right-turn, or U-turn lane is present on an approach and if a primary separate turn signal face controlling that lane is mounted over the roadway, the primary separate turn signal face shall not be positioned any further to the right than the extension of the right-hand edge of the exclusive turn lane or any further to the left than the extension of the left-hand edge of the exclusive turn lane.</b></p> <p><b>08 Supplemental turn signal faces mounted</b></p>	<p>The required signal faces for through traffic on an approach shall be located not less than 2.4 m (8 ft) apart measured horizontally perpendicular to the approach between the centers of the signal faces.</p> <p>If more than one separate turn signal face is provided for a turning movement and if one or both of the separate turn signal faces are located over the roadway, the signal faces shall be located not less than 2.4 m (8 ft) apart measured horizontally perpendicular to the approach between the centers of the signal faces.</p> <p>Guidance:  If a signal face controls a specific lane or lanes of an approach, its position should make it readily visible to road users making that movement.</p> <p>Support:  Section 4D.11 contains additional provisions regarding lateral positioning of signal faces for approaches having a posted or statutory speed limit or an 85th-percentile speed of 45 mph or higher.</p> <p>Standard:  If an exclusive left-turn, right-turn, or U-turn lane is present on an approach and if a primary separate turn signal face controlling that lane is mounted over the roadway, the primary separate turn signal face shall not be positioned any further to the right than the extension of the right-hand edge of the exclusive turn lane or any further to the left than the extension of the left-hand edge of the exclusive turn lane.</p> <p>Supplemental turn signal faces mounted over</p>	
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<p>positioning requirements in the previous paragraph.</p> <p>Guidance: For new or reconstructed signal installations, on an approach with an exclusive turn lane(s) for a left-turn (or U-turn to the left) movement and with opposing vehicular traffic, signal faces that display a CIRCULAR GREEN signal indication should not be post-mounted on the far-side median or mounted overhead above the exclusive turn lane(s) or the extension of the lane(s).</p> <p>Standard: If supplemental post-mounted signal faces are used, the following limitations shall apply: A. Left-turn arrows and U-turn arrows to the left shall not be used in near-right signal faces. B. Right-turn arrows and U-turn arrows to the right shall not be used in far-left signal faces. A far-side median-mounted signal face shall be considered a far-left signal for this application.</p> <p>Section 4D.14 Longitudinal Positioning of Signal Faces STANDARD Except where the width of an intersecting roadway or other conditions make it physically impractical the signal faces for each approach to an intersection or a midblock location shall be provided as follows: <del>D. Except where the width of an intersecting roadway or other conditions make it physically</del></p>	<p><b>over the roadway shall not be subject to the positioning requirements in the previous paragraph.</b></p> <p><i>Guidance:</i> <i>09 For new or reconstructed signal installations, on an approach with an exclusive turn lane(s) for a left-turn (or U-turn to the left) movement and with opposing vehicular traffic, signal faces that display a CIRCULAR GREEN signal indication should not be post-mounted on the far-side median or mounted overhead above the exclusive turn lane(s) or the extension of the lane(s).</i></p> <p><b>Standard:</b> <b>10 If supplemental post-mounted signal faces are used, the following limitations shall apply:</b> <b>A. Left-turn arrows and U-turn arrows to the left shall not be used in near-right signal faces.</b> <b>B. Right-turn arrows and U-turn arrows to the right shall not be used in far-left signal faces. A far-side median-mounted signal face shall be considered a far-left signal for this application.</b></p> <p><b>Section 4D.14 Longitudinal Positioning of Signal Faces</b> <b>Standard:</b> <b>01 Except where the width of an intersecting roadway or other conditions make it physically impractical, the signal faces for each approach to an intersection or a midblock location shall be provided as follows:</b> <b>A. A signal face installed to satisfy the</b></p>	<p>the roadway shall not be subject to the positioning requirements in the previous paragraph.</p> <p>Guidance: For new or reconstructed signal installations, on an approach with an exclusive turn lane(s) for a left-turn (or U-turn to the left) movement and with opposing vehicular traffic, signal faces that display a CIRCULAR GREEN signal indication should not be post-mounted on the far-side median or mounted overhead above the exclusive turn lane(s) or the extension of the lane(s).</p> <p>Standard: If supplemental post-mounted signal faces are used, the following limitations shall apply: A. Left-turn arrows and U-turn arrows to the left shall not be used in near-right signal faces. B. Right-turn arrows and U-turn arrows to the right shall not be used in far-left signal faces. A far-side median-mounted signal face shall be considered a far-left signal for this application.</p> <p>Section 4D.14 Longitudinal Positioning of Signal Faces STANDARD Except where the width of an intersecting roadway or other conditions make it physically impractical the signal faces for each approach to an intersection or a midblock location shall be provided as follows: A. A signal face installed to satisfy the requirements for primary left-turn signal faces</p>	<p>Relocated from 4D.15</p> <p>Recommend changing per federal manual</p>
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<p><del>impractical:</del></p> <p><del>1.</del> A. A signal face installed to satisfy the requirements for <b>primary</b> left-turn signal faces (see Sections 4D.0617 and 4D.20) and <b>primary</b> right-turn signal faces (see Sections 4D.0721 through 4D.24), and at least one and preferably both of the <b>minimum</b> of two <b>primary</b> signal faces required for the <del>major</del> through movement (or the major turning movement if there is no through movement) on the approach shall be located:</p> <p><del>(a)</del> 1. Not less than 12 m (40 ft) beyond the stop line.</p> <p><del>(b)</del> 2. Not more than 55 m (180 ft) beyond the stop line unless a supplemental near side signal face is provided.</p> <p><del>(c)</del> 3. As near as practical to the line of the driver's normal view, if mounted over the roadway.</p> <p>The primary signal face that satisfies this requirement shall simultaneously satisfy the lateral placement requirement described in Section 4D.13 (see Figure 4D-4).</p> <p><del>2.</del> B. Where the nearest signal face is located between 45 and 55 m (150 and 180 ft) beyond the stop line, engineering judgment of the conditions, including the worst-case visibility conditions, shall be used to determine if the provision of a supplemental near side signal face would be beneficial.</p> <p>Support: Section 4D.11 contains additional provisions regarding longitudinal positioning of signal faces for approaches having a posted or 85th-percentile speed of 45 mph or higher.</p> <p>GUIDANCE Supplemental <del>N</del>near-side signal faces should be located as near as practical to the stop line.</p>	<p><b>requirements for primary left-turn signal faces (see Sections 4D.17 through 4D.20) and primary right-turn signal faces (see Sections 4D.21 through 4D.24), and at least one and preferably both of the minimum of two primary signal faces required for the through movement (or the major turning movement if there is no through movement) on the approach shall be located:</b></p> <p><b>1. No less than 40 feet beyond the stop line,</b></p> <p><b>2. No more than 180 feet beyond the stop line unless a supplemental near-side signal face is provided, and</b></p> <p><b>3. As near as practical to the line of the driver's normal view, if mounted over the roadway. The primary signal face that satisfies this requirement shall simultaneously satisfy the lateral placement requirement described in Section 4D.13 (see Figure 4D-4).</b></p> <p><b>B. Where the nearest signal face is located between 150 and 180 feet beyond the stop line, engineering judgment of the conditions, including the worst-case visibility conditions, shall be used to determine if the provision of a supplemental near-side signal face would be beneficial.</b></p> <p>Support: 02 Section 4D.11 contains additional provisions regarding longitudinal positioning of signal faces for approaches having a posted or 85th-percentile speed of 45 mph or higher.</p> <p>Guidance: 03 Supplemental near-side signal faces should be located as near as practical to the stop line.</p>	<p>(see Sections 4D.17 and 4D.20) and primary right-turn signal faces (see Sections 4D.21 through 4D.24), and at least one and preferably both of the minimum of two primary signal faces required for the through movement (or the major turning movement if there is no through movement) on the approach shall be located:</p> <ol style="list-style-type: none"> <li>1. No less than 12 m (40 ft) beyond the stop line.</li> <li>2. No more than 55 m (180 ft) beyond the stop line unless a supplemental near side signal face is provided.</li> <li>3. As near as practical to the line of the driver's normal view, if mounted over the roadway.</li> </ol> <p>The primary signal face that satisfies this requirement shall simultaneously satisfy the lateral placement requirement described in Section 4D.13 (see Figure 4D-4).</p> <p>B. Where the nearest signal face is located between 45 and 55 m (150 and 180 ft) beyond the stop line, engineering judgment of the conditions, including the worst-case visibility conditions, shall be used to determine if the provision of a supplemental near side signal face would be beneficial.</p> <p>Support: Section 4D.11 contains additional provisions regarding longitudinal positioning of signal faces for approaches having a posted or 85th-percentile speed of 45 mph or higher.</p> <p>GUIDANCE Supplemental near-side signal faces should be located as near as practical to the stop line.</p>	
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<p><b>4D.15 Mounting Height of Signal Faces</b></p> <p><b>STANDARD</b>  The top of the signal housing of a vehicular signal face located over <del>a roadway</del> any portion of a highway that can be used by motor vehicles shall not be more than 7.8 m (25.6 ft) above the pavement.</p> <p><del>3. A signal face installed to satisfy the requirements for left turn signal faces (see Section 4D.6) and right turn signal faces (see Section 4D.7), and at least one and preferably both of the two signal faces required for the major movement on the approach shall be located no higher than at a maximum height to the top of the signal housing mounted over a roadway of 7.8 m (25.6 ft) above the pavement (see Section 4D.17). For viewing distances between 12 m (40 ft) and 16 m (53 ft) from the stop line, the maximum mounting height to the top of the signal housing shall be as shown on Figure 4D-15. (See Section 4D.17 for additional information regarding mounting heights.)</del></p> <p>The bottom of the signal housing and any related attachments to a vehicular signal face located over <del>a roadway</del> any portion of a highway that can be used by motor vehicles shall be at least <b>5.2 m (17 ft) and no more than 5.8m (19 ft.)</b> above the pavement.</p> <p>The bottom of the signal housing (including brackets) of a vehicular signal face that is vertically arranged and not located over a roadway:</p> <p>A. Shall be <del>at least a minimum of</del> 2.4 m (8 ft) <del>but not more than</del> and a maximum of 5.8 m (19 ft) above the sidewalk or, if there is no sidewalk, above the pavement grade at the center of the roadway.</p>	<p><b>Section 4D.15 Mounting Height of Signal Faces</b></p> <p><b>Standard:</b></p> <p>01 <b>The top of the signal housing of a vehicular signal face located over any portion of a highway that can be used by motor vehicles shall not be more than 25.6 feet above the pavement.</b></p> <p>02 <b>For viewing distances between 40 and 53 feet from the stop line, the maximum mounting height to the top of the signal housing shall be as shown in Figure 4D-5.</b></p> <p>03 <b>The bottom of the signal housing and any related attachments to a vehicular signal face located over any portion of a highway that can be used by motor vehicles shall be at least 15 feet above the pavement.</b></p> <p>04 <b>The bottom of the signal housing (including brackets) of a vehicular signal face that is vertically arranged and not located over a roadway:</b></p> <p><b>A. Shall be a minimum of 8 feet and a maximum of 19 feet above the sidewalk or, if there is no sidewalk, above the pavement grade at the center of the roadway.</b></p> <p><b>B. Shall be a minimum of 4.5 feet and a maximum of 19 feet above the median island grade of a center median island if located on the near side of the intersection.</b></p> <p>05 <b>The bottom of the signal housing (including brackets) of a vehicular signal face that is horizontally arranged and not located over a roadway:</b></p> <p><b>A. Shall be a minimum of 8 feet and a maximum of 22 feet above the sidewalk or, if there is no sidewalk, above the pavement grade at the center of the roadway.</b></p> <p><b>B. Shall be a minimum of 4.5 feet and a maximum of 22 feet above the median island grade of a center median island if located on</b></p>	<p><b>4D.15 Mounting Height of Signal Faces</b></p> <p><b>STANDARD</b>  The top of the signal housing of a vehicular signal face located over any portion of a highway that can be used by motor vehicles shall not be more than 25.6 ft above the pavement.</p> <p>For viewing distances between 40 feet and 53 feet from the stop line, the maximum mounting height to the top of the signal housing shall be as shown on Figure 4D-5.</p> <p>The bottom of the signal housing and any related attachments to a vehicular signal face located over any portion of a highway that can be used by motor vehicles shall be at least <b>17 feet and no more than 19 feet</b> above the pavement.</p> <p>The bottom of the signal housing (including brackets) of a vehicular signal face that is vertically arranged and not located over a roadway:</p> <p>A. Shall be a minimum of 2.4 m (8 ft) and a maximum of 5.8 m (19 ft) above the sidewalk or, if there is no sidewalk, above the pavement grade at the center of the roadway.</p> <p>B. Shall be a minimum of 4.5 feet and a maximum of 19 feet above the median island grade of a center median island if located on the near side of the intersection.</p> <p>The bottom of the signal housing (including brackets) of a vehicular signal face that is horizontally arranged and not located over a roadway:</p> <p>A. Shall be a minimum of 8 feet and a maximum 22 feet above the sidewalk or, if there is no sidewalk, above the pavement grade at the center of the roadway.</p> <p>B. Shall a minimum of 4.5 feet and a maximum 22 feet above the median island</p>	<p>Part of Section 4D.15 relocated from 4D.17</p> <p>Recommend change per fed manual keeping Mn language</p> <p>Keep MN language</p>
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<p>B. Shall be <del>at least</del> a minimum of 1.4 m (4.5 ft) <del>but not more than</del> and a maximum of 5.8 m (19 ft) above the median island grade of a center median island if located on the near side of the intersection.</p> <p>The bottom of the signal housing (including brackets) of a vehicular signal face that is horizontally arranged and not located over a roadway:</p> <p>A. Shall be <del>at least</del> a minimum of 2.4 m (8 ft) <del>but not more than</del> and a maximum 6.7 m (22 ft) above the sidewalk or, if there is no sidewalk, above the pavement grade at the center of the roadway.</p> <p>B. Shall be <del>at least</del> a minimum of 1.4 m (4.5 ft) <del>but not more than</del> and a maximum 6.7 m (22 ft) above the median island grade of a center median island if located on the near side of the intersection.</p> <p><b>Section 4D.16 Lateral Offset (Clearance) of Signal Faces</b></p> <p>Standard: Signal <del>heads</del> faces mounted <del>at the side of a roadway with curbs</del> at less than 4.6 meters (15 feet) from the bottom of the housing and any related attachments <del>at the side of a roadway with curbs</del> shall have a horizontal <del>clearance</del> offset of not less than 0.6 m (2 ft) from the face of a vertical curb; <del>or if</del> <del>if</del> there is no curb, <del>signal heads shall have a horizontal clearance of</del> not less than 0.6 m (2 ft) from the edge of a shoulder.</p> <p><b>4D.617 Application of Steady Signal</b></p>	<p><b>the near side of the intersection.</b></p> <p><b>Section 4D.16 Lateral Offset (Clearance) of Signal Faces</b></p> <p><b>Standard:</b> 01 <b>Signal faces mounted at the side of a roadway with curbs at less than 15 feet from the bottom of the housing and any related attachments shall have a horizontal offset of not less than 2 feet from the face of a vertical curb, or if there is no curb, not less than 2 feet from the edge of a shoulder.</b></p>	<p>grade of a center median island if located on the near side of the intersection.</p> <p><b>Section 4D.16 Lateral Offset (Clearance) of Signal Faces</b></p> <p>Standard: Signal faces mounted at the side of a roadway with curbs at less than 4.6 meters (15 feet) from the bottom of the housing and any related attachments shall have a horizontal offset of not less than 0.6 m (2 ft) from the face of a vertical curb; <del>or if</del> <del>if</del> there is no curb, not less than 0.6 m (2 ft) from the edge of a shoulder.</p>	<p>Relocated from 4D.17 Recommend using fed language</p>
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**Indications for Left Turns Movements--  
General**

Standard:  
In Sections 4D.17 through 4D.20, provisions applicable to left-turn movements and left-turn lanes shall also apply to signal indications for U-turns to the left that are provided at locations where left turns are prohibited or not geometrically possible.

SUPPORT  
Left-turning traffic is controlled by one of four modes as follows:

- A. Permissive Only Mode—turns made on ~~the~~ a CIRCULAR GREEN signal indication, a flashing left-turn YELLOW ARROW signal indication or a flashing left-turn RED ARROW signal indication after yielding to **any** pedestrians, ~~if any,~~ and/or ~~oncoming~~ **any** opposing traffic, ~~if any and pedestrians~~ **,lawfully within the intersection.;**
- B. Protected Only Mode—turns made only when ~~the~~ a left-turn GREEN ARROW signal indication is displayed;
- C. Protected/Permissive Mode—both modes ~~can~~ occur on an approach during the same cycle; or
- D. Variable Left-Turn Mode—the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during different periods of the day ~~or as traffic conditions change.~~

OPTION  
In areas having a high percentage of ~~elderly~~ **older** drivers, special consideration may be given to the use of protected only mode left-turn phasing, when appropriate.  
STANDARD

**Section 4D.17 Signal Indications for  
Left-Turn Movements – General  
Standard:  
01 In Sections 4D.17 through 4D.20,  
provisions applicable to left-turn movements  
and left-turn lanes shall also apply to signal  
indications for U-turns to the left that are  
provided at locations where left turns are  
prohibited or not geometrically possible.**

Support:  
02 Left-turning traffic is controlled by one of four modes as follows:  
A. Permissive Only Mode—turns made on a CIRCULAR GREEN signal indication, a flashing left-turn YELLOW ARROW signal indication, or a flashing left-turn RED ARROW signal indication after yielding to pedestrians, if any, and/or opposing traffic, if any.  
B. Protected Only Mode—turns made only when a left-turn GREEN ARROW signal indication is displayed.  
C. Protected/Permissive Mode—both modes can occur on an approach during the same cycle.  
D. Variable Left-Turn Mode—the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during different periods of the day or as traffic conditions change.  
Option:  
03 In areas having a high percentage of older drivers, special consideration may be given to the use of protected only mode left-turn phasing, when appropriate.

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

Standard:  
In Sections 4D.17 through 4D.20, provisions applicable to left-turn movements and left-turn lanes shall also apply to signal indications for U-turns to the left that are provided at locations where left turns are prohibited or not geometrically possible.

SUPPORT  
Left-turning traffic is controlled by one of four modes as follows:

- A. Permissive Only Mode—turns made on a CIRCULAR GREEN signal indication, a flashing left-turn YELLOW ARROW signal indication or a flashing left-turn RED ARROW signal indication after yielding to **any** pedestrians and/or **any** opposing traffic **lawfully within the intersection.**
- B. Protected Only Mode—turns made only when a left-turn GREEN ARROW signal indication is displayed;
- C. Protected/Permissive Mode—both modes can occur on an approach during the same cycle; or
- D. Variable Left-Turn Mode—the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during different periods of the day or as traffic conditions change.

OPTION  
In areas having a high percentage of older drivers, special consideration may be given to the use of protected only mode left-turn phasing, when appropriate.  
STANDARD  
During a permissive left-turn movement, the

Recommend using fed lang. with new MN language

<p>During a permissive left-turn movement, the signal faces for through traffic on the opposing approach shall simultaneously display green or steady yellow signal indications. If pedestrians crossing the lane or lanes used by the permissive left-turn movement to depart the intersection are controlled by pedestrian signal heads, the signal indications displayed by those pedestrian signal heads shall not be limited to any particular display during the permissive left-turn movement.</p> <p>During a protected left-turn movement, the signal faces for through traffic on the opposing approach shall simultaneously display steady CIRCULAR RED signal indications. If pedestrians crossing the lane or lanes used by the protected left-turn movement to depart the intersection are controlled by pedestrian signal heads, the pedestrian signal heads shall display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication during the protected left-turn movement.</p> <p>A protected only mode left-turn movement that does not begin and terminate at the same time as the adjacent through movement shall not be provided on an approach unless an exclusive left-turn lane exists.</p> <p>A yellow change interval for the left-turn movement shall not be displayed when the status of the left-turn operation is changing from permissive to protected within any given signal sequence.</p> <p><del>D. Variable Left Turn Mode—If the protected only operating mode occurs during one or more periods of the day, and the permissive only mode or the combined protected/permissive mode occurs</del> changes</p>	<p><b>Standard:</b></p> <p>04 <b>During a permissive left-turn movement, the signal faces for through traffic on the opposing approach shall simultaneously display green or steady yellow signal indications. If pedestrians crossing the lane or lanes used by the permissive left-turn movement to depart the intersection are controlled by pedestrian signal heads, the signal indications displayed by those pedestrian signal heads shall not be limited to any particular display during the permissive left-turn movement.</b></p> <p>05 <b>During a protected left-turn movement, the signal faces for through traffic on the opposing approach shall simultaneously display steady CIRCULAR RED signal indications. If pedestrians crossing the lane or lanes used by the protected left-turn movement to depart the intersection are controlled by pedestrian signal heads, the pedestrian signal heads shall display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication during the protected left-turn movement.</b></p> <p>06 <b>A protected only mode left-turn movement that does not begin and terminate at the same time as the adjacent through movement shall not be provided on an approach unless an exclusive left-turn lane exists.</b></p> <p>07 <b>A yellow change interval for the left-turn movement shall not be displayed when the status of the left-turn operation is changing from permissive to protected within any given signal sequence.</b></p> <p>08 <b>If the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during</b></p>	<p>signal faces for through traffic on the opposing approach shall simultaneously display green or steady yellow signal indications. If pedestrians crossing the lane or lanes used by the permissive left-turn movement to depart the intersection are controlled by pedestrian signal heads, the signal indications displayed by those pedestrian signal heads shall not be limited to any particular display during the permissive left-turn movement.</p> <p>During a protected left-turn movement, the signal faces for through traffic on the opposing approach shall simultaneously display steady CIRCULAR RED signal indications. If pedestrians crossing the lane or lanes used by the protected left-turn movement to depart the intersection are controlled by pedestrian signal heads, the pedestrian signal heads shall display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication during the protected left-turn movement.</p> <p>A protected only mode left-turn movement that does not begin and terminate at the same time as the adjacent through movement shall not be provided on an approach unless an exclusive left-turn lane exists.</p> <p>A yellow change interval for the left-turn movement shall not be displayed when the status of the left-turn operation is changing from permissive to protected within any given signal sequence.</p> <p>If the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during other different periods of the day or as traffic conditions</p>	<p>Compliance Date? none</p>
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<p>among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during <del>other</del> different periods of the day or as traffic conditions change, the requirements of <del>Items A, B, and C</del> in <del>this Standard</del> Sections 4D.18 through 4D.20 that are appropriate to that mode of operation shall be met, subject to the following:</p> <p><del>1.</del> A. The CIRCULAR GREEN and CIRCULAR YELLOW signal indications shall not be displayed when operating in the protected only mode.</p> <p><del>2.</del> B. The left-turn GREEN ARROW and left-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode.</p> <p>OPTION</p> <p>Additional <del>appropriate signal indications</del> static signs or changeable message signs may be used to meet the requirements for the variable left-turn mode or to inform drivers that left-turn green arrows will not be available during certain times of the day.</p> <p>Support:</p> <p>Sections 4D.17 through 4D.20 describe the use of the following two types of signal faces for controlling left-turn movements:</p> <p>A. Shared signal face – This type of signal face controls both the left-turn movement and the adjacent movement (usually the through movement) and can serve as one of the two required primary signal faces for the adjacent movement. A shared signal face always displays the same color of circular indication that is displayed by the signal face or faces for the adjacent movement. 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</p>	<p><b>different periods of the day or as traffic conditions change, the requirements in Sections 4D.18 through 4D.20 that are appropriate to that mode of operation shall be met, subject to the following:</b></p> <p><b>A. The CIRCULAR GREEN and CIRCULAR YELLOW signal indications shall not be displayed when operating in the protected only mode.</b></p> <p><b>B. The left-turn GREEN ARROW and left-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode.</b></p> <p>Option:</p> <p>09 Additional static signs or changeable message signs may be used to meet the requirements for the variable left-turn mode or to inform drivers that left-turn green arrows will not be available during certain times of the day.</p> <p>Support:</p> <p>10 Sections 4D.17 through 4D.20 describe the use of the following two types of signal faces for controlling left-turn movements:</p> <p>A. Shared signal face – This type of signal face controls both the left-turn movement and the adjacent movement (usually the through movement) and can serve as one of the two required primary signal faces for the adjacent movement. A shared signal face always displays the same color of circular indication that is displayed by the signal face or faces for the adjacent movement. If a shared signal face that provides protected/permissive mode left turns is mounted overhead at the intersection, it</p>	<p>change, the requirements in Sections 4D.18 through 4D.20 that are appropriate to that mode of operation shall be met, subject to the following:</p> <p>A. The CIRCULAR GREEN and CIRCULAR YELLOW signal indications shall not be displayed when operating in the protected only mode.</p> <p>B. The left-turn GREEN ARROW and left-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode.</p> <p>OPTION</p> <p>Additional static signs or changeable message signs may be used to meet the requirements for the variable left-turn mode or to inform drivers that left-turn green arrows will not be available during certain times of the day.</p> <p>Support:</p> <p>Sections 4D.17 through 4D.20 describe the use of the following two types of signal faces for controlling left-turn movements:</p> <p>A. Shared signal face – This type of signal face controls both the left-turn movement and the adjacent movement (usually the through movement) and can serve as one of the two required primary signal faces for the adjacent movement. A shared signal face always displays the same color of circular indication that is displayed by the signal face or faces for the adjacent movement. 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</p>	
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<p>separating the left-turn lane from the adjacent lane.</p> <p>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 primary signal faces for the adjacent movement (usually the through movement) because it displays signal indications that are applicable only to the left-turn movement. If a separate left-turn signal face is mounted overhead at the intersection, it is positioned over the extension of the left-turn lane. 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.</p> <p>Section 4D.13 contains provisions regarding the lateral positioning of signal faces that control left-turn movements.</p> <p>It is not necessary that the same mode of left-turn operation or same type of left-turn signal face be used on every approach to a signalized location. Selecting different modes and types of left-turn signal faces for the various approaches to the same signalized location is acceptable.</p> <p>Option: A signal face that is shared by left-turning and right-turning traffic may be provided for a shared left-turn/right-turn lane on an approach that has no through traffic (see Section 4D.25).</p> <p>Section 4D.18 Signal Indications for Permissive Only Mode Left-Turn</p>	<p>is usually positioned over or slightly to the right of the extension of the lane line separating the left-turn lane from the adjacent lane.</p> <p>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 primary signal faces for the adjacent movement (usually the through movement) because it displays signal indications that are applicable only to the left-turn movement. If a separate left-turn signal face is mounted overhead at the intersection, it is positioned over the extension of the left-turn lane. 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.</p> <p>11 Section 4D.13 contains provisions regarding the lateral positioning of signal faces that control left-turn movements.</p> <p>12 It is not necessary that the same mode of left-turn operation or same type of left-turn signal face be used on every approach to a signalized location. Selecting different modes and types of left-turn signal faces for the various approaches to the same signalized location is acceptable.</p> <p>Option: 13 A signal face that is shared by left-turning and right-turning traffic may be provided for a shared left-turn/right-turn lane on an approach that has no through traffic (see Section 4D.25).</p>	<p>lane.</p> <p>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 primary signal faces for the adjacent movement (usually the through movement) because it displays signal indications that are applicable only to the left-turn movement. If a separate left-turn signal face is mounted overhead at the intersection, it is positioned over the extension of the left-turn lane. 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.</p> <p>Section 4D.13 contains provisions regarding the lateral positioning of signal faces that control left-turn movements.</p> <p>It is not necessary that the same mode of left-turn operation or same type of left-turn signal face be used on every approach to a signalized location. Selecting different modes and types of left-turn signal faces for the various approaches to the same signalized location is acceptable.</p> <p>Option: A signal face that is shared by left-turning and right-turning traffic may be provided for a shared left-turn/right-turn lane on an approach that has no through traffic (see Section 4D.25).</p> <p>Section 4D.18 Signal Indications for</p>	<p>Recommend changing with notes below</p>
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<p><b>Movements</b></p> <p><b>Standard:</b>  <del>The required left turn signal faces and operation for an approach shall be determined by the selected mode of left turn operation, as follows:</del></p> <p><del>A. Permissive Only Mode</del>—If a shared signal face is provided for a permissive only mode left turn, it shall meet the following requirements (see Figure 4D-6):</p> <p>A. <del>The signal indications for permissive only mode left turns shall be provided by the signal faces controlling the through movement, or by a permissive only left turn signal face that is a shared left turn signal face.</del> It shall be capable of displaying 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.</p> <p>B. During the permissive left-turn movement, a CIRCULAR GREEN signal indication shall be displayed.</p> <p>C. A permissive-only shared left-turn signal face, regardless of where <del>the permissive only left turn signal face</del> it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</p> <p>D. If the permissive only mode is not the only left-turn mode used for the approach, the signal face shall be the same shared 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</p>	<p><b>Section 4D.18 Signal Indications for Permissive Only Mode Left-Turn Movements</b></p> <p><b>Standard:</b>  <sup>01</sup> <b>If a shared signal face is provided for a permissive only mode left turn, it shall meet the following requirements (see Figure 4D-6):</b></p> <p><b>A. It shall be capable of displaying 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></p> <p><b>B. During the permissive left-turn movement, a CIRCULAR GREEN signal indication shall be displayed.</b></p> <p><b>C. A permissive only shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</b></p> <p><b>D. If the permissive only mode is not the only left-turn mode used for the approach, the signal face shall be the same shared 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.</b></p>	<p><b>Permissive Only Mode Left-Turn Movements</b></p> <p><b>Standard:</b>  If a shared signal face is provided for a permissive only mode left turn, it shall meet the following requirements (see Figure 4D-6):</p> <p>A. It shall be capable of displaying 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.</p> <p>B. During the permissive left-turn movement, a CIRCULAR GREEN signal indication shall be displayed.</p> <p>C. A permissive-only shared left-turn signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</p> <p>D. If the permissive only mode is not the only left-turn mode used for the approach, the signal face shall be the same shared 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.</p>	<p>This lang. appears to have been in last fed manual, but not MN manual</p> <p>Language removed from fed manual appears to not have been in Mn manual. Only new language is shown</p>
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<p>only mode.</p> <p>If a separate left-turn signal face is being operated in a permissive only left-turns mode, a CIRCULAR GREEN signal indication shall not be used in that face.</p> <p>If a separate left-turn signal face is being operated in a permissive only left-turn mode and a flashing left-turn YELLOW ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-7):</p> <p>A. It shall be capable of displaying the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, and flashing left-turn YELLOW ARROW. Only one of the three indications shall be displayed at any given time.</p> <p>B. During the permissive left-turn movement, a flashing left-turn YELLOW ARROW signal indication shall be displayed.</p> <p>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn YELLOW ARROW signal indication.</p> <p>D. It shall be permitted to display a flashing left-turn YELLOW ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p> <p>E. During steady mode (stop-and-go) operation, the signal section that displays the steady left-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing left-turn YELLOW ARROW signal indication for permissive left turns.</p>	<p><b>02 If a separate left-turn signal face is being operated in a permissive only left-turns mode, a CIRCULAR GREEN signal indication shall not be used in that face.</b></p> <p><b>03 If a separate left-turn signal face is being operated in a permissive only left-turn mode and a flashing left-turn YELLOW ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-7):</b></p> <p><b>A. It shall be capable of displaying the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, and flashing left-turn YELLOW ARROW. Only one of the three indications shall be displayed at any given time.</b></p> <p><b>B. During the permissive left-turn movement, a flashing left-turn YELLOW ARROW signal indication shall be displayed.</b></p> <p><b>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn YELLOW ARROW signal indication.</b></p> <p><b>D. It shall be permitted to display a flashing left-turn YELLOW ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</b></p> <p><b>E. During steady mode (stop-and-go) operation, the signal section that displays the steady left-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing left-</b></p>	<p>If a separate left-turn signal face is being operated in a permissive only left-turns mode, a CIRCULAR GREEN signal indication shall not be used in that face.</p> <p>If a separate left-turn signal face is being operated in a permissive only left-turn mode and a flashing left-turn YELLOW ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-7):</p> <p>A. It shall be capable of displaying the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, and flashing left-turn YELLOW ARROW. Only one of the three indications shall be displayed at any given time.</p> <p>B. During the permissive left-turn movement, a flashing left-turn YELLOW ARROW signal indication shall be displayed.</p> <p>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn YELLOW ARROW signal indication.</p> <p>D. It shall be permitted to display a flashing left-turn YELLOW ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p> <p>E. During steady mode (stop-and-go) operation, the signal section that displays the steady left-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing left-turn YELLOW ARROW signal indication for permissive left turns.</p> <p>F. During flashing mode operation (see Section 4D.30), the display of a flashing left-turn</p>	<p>This requires use of FYA if head is over the left turn lane.</p> <p>What is compliance date?  <b>None</b>  Would like to add for new or reconstructed signal installations-<b>this is assumed if no compliance date.</b></p>
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<p>F. During flashing mode operation (see Section 4D.30), the display of a flashing left-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady left-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</p> <p>G. 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 with a flashing YELLOW ARROW signal indication that is used for the protected/permissive mode (see Section 4D.20) except that the left-turn GREEN ARROW signal indication shall not be displayed when operating in the permissive only mode.</p> <p>Option: A separate left-turn signal face with a flashing left-turn RED ARROW signal indication during the permissive left-turn movement may be used for unusual geometric conditions, such as wide medians with offset left-turn lanes, but only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn.</p> <p>Standard: If a separate left-turn signal face is being operated in a permissive only left-turn mode and a flashing left-turn RED ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-8): A. It shall be capable of displaying the following signal indications: steady or flashing left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the <del>three</del> four</p>	<p><b>turn YELLOW ARROW signal indication for permissive left turns.</b></p> <p><b>F. During flashing mode operation (see Section 4D.30), the display of a flashing left-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady left-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</b></p> <p><b>G. 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 with a flashing YELLOW ARROW signal indication that is used for the protected/permissive mode (see Section 4D.20) except that the left-turn GREEN ARROW signal indication shall not be displayed when operating in the permissive only mode.</b></p> <p>Option: 04 A separate left-turn signal face with a flashing left-turn RED ARROW signal indication during the permissive left-turn movement may be used for unusual geometric conditions, such as wide medians with offset left-turn lanes, but only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn.</p> <p><b>Standard:</b> 05 <b>If a separate left-turn signal face is being operated in a permissive only left-turn mode and a flashing left-turn RED ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-8):</b> <b>A. It shall be capable of displaying the following signal indications: steady or flashing left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn</b></p>	<p>YELLOW ARROW signal indication shall be only from the signal section that displays a steady left-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</p> <p>G. 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 with a flashing YELLOW ARROW signal indication that is used for the protected/permissive mode (see Section 4D.20) except that the left-turn GREEN ARROW signal indication shall not be displayed when operating in the permissive only mode.</p> <p>Option: A separate left-turn signal face with a flashing left-turn RED ARROW signal indication during the permissive left-turn movement may be used for unusual geometric conditions, such as wide medians with offset left-turn lanes, but only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn.</p> <p>Standard: If a separate left-turn signal face is being operated in a permissive only left-turn mode and a flashing left-turn RED ARROW signal indication is provided, it shall meet the following requirements (see Figure 4D-8): A. It shall be capable of displaying the following signal indications: steady or flashing left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the four indications shall be displayed at any given time. The GREEN ARROW indication</p>	<p>Figure 4D-8 recommend only showing 2 on top with 2 more down</p> <p>This should be four, not three</p>
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<p>indications shall be displayed at any given time. The GREEN ARROW indication is required in order to provide a three-section signal face, but shall not be displayed during the permissive only mode.</p> <p>B. During the permissive left-turn movement, a flashing left-turn RED ARROW signal indication shall be displayed, thus indicating that each and every vehicle must successively come to a full stop before making a permissive left turn.</p> <p>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn RED ARROW signal indication.</p> <p>D. It shall be permitted to display a flashing left-turn RED ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p> <p>E. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</p> <p><b>Option Guidance:</b> The requirements of Item A in Paragraph 5 <del>may</del> <b>above should</b> be met by a vertically-arranged signal face with a horizontal cluster of two left-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-8).</p>	<p><b>GREEN ARROW. Only one of the three indications shall be displayed at any given time. The GREEN ARROW indication is required in order to provide a three-section signal face, but shall not be displayed during the permissive only mode.</b></p> <p><b>B. During the permissive left-turn movement, a flashing left-turn RED ARROW signal indication shall be displayed, thus indicating that each and every vehicle must successively come to a full stop before making a permissive left turn.</b></p> <p><b>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn RED ARROW signal indication.</b></p> <p><b>D. It shall be permitted to display a flashing left-turn RED ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</b></p> <p><b>E. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</b></p> <p>Option: 06 The requirements of Item A in Paragraph 5 may be met by a vertically-arranged signal face with a horizontal cluster of two left-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-8).</p>	<p>is required in order to provide a three-section signal face, but shall not be displayed during the permissive only mode.</p> <p>B. During the permissive left-turn movement, a flashing left-turn RED ARROW signal indication shall be displayed, thus indicating that each and every vehicle must successively come to a full stop before making a permissive left turn.</p> <p>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn RED ARROW signal indication.</p> <p>D. It shall be permitted to display a flashing left-turn RED ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p> <p>E. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</p> <p><b>Guidance:</b> The requirements of Item A <b>above should</b> be met by a vertically-arranged signal face with a horizontal cluster of two left-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-8).</p>	<p>indications</p> <p>Recommend changing option to guidance</p> <p>Remove paragraph reference and change may to should</p>
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<p>Section 4D.19 Signal Indications for Protected Only Mode Left-Turn Movements</p> <p>Standard:</p> <p>A shared signal face shall not be used for protected only mode left turns unless the CIRCULAR GREEN and left-turn GREEN ARROW signal indications always begin and terminate together. If a shared signal face is provided for a protected only mode left turn, it shall meet the following requirements (see Figure 4D-9):</p> <p>A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR GREEN, and left-turn GREEN ARROW. Only one of the three colors shall be displayed at any given time.</p> <p>B. During the protected left-turn movement, the shared signal face shall simultaneously display both a CIRCULAR GREEN signal indication and a left-turn GREEN ARROW signal indication.</p> <p>C. The shared signal face shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</p> <p>D. If the protected only mode is not the only left-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.20).</p> <p>Option:</p> <p>A straight-through GREEN ARROW signal indication may be used instead of the</p>	<p><b>Section 4D.19 Signal Indications for Protected Only Mode Left-Turn Movements</b></p> <p><b>Standard:</b></p> <p><b>01 A shared signal face shall not be used for protected only mode left turns unless the CIRCULAR GREEN and left-turn GREEN ARROW signal indications always begin and terminate together. If a shared signal face is provided for a protected only mode left turn, it shall meet the following requirements (see Figure 4D-9):</b></p> <p><b>A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR GREEN, and left-turn GREEN ARROW. Only one of the three colors shall be displayed at any given time.</b></p> <p><b>B. During the protected left-turn movement, the shared signal face shall simultaneously display both a CIRCULAR GREEN signal indication and a left-turn GREEN ARROW signal indication.</b></p> <p><b>C. The shared signal face shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</b></p> <p><b>D. If the protected only mode is not the only left-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.20).</b></p> <p>Option:</p> <p>02 A straight-through GREEN ARROW signal indication may be used instead of the CIRCULAR GREEN signal indication in Items</p>	<p>Section 4D.19 Signal Indications for Protected Only Mode Left-Turn Movements</p> <p>Standard:</p> <p>A shared signal face shall not be used for protected only mode left turns unless the CIRCULAR GREEN and left-turn GREEN ARROW signal indications always begin and terminate together. If a shared signal face is provided for a protected only mode left turn, it shall meet the following requirements (see Figure 4D-9):</p> <p>A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR GREEN, and left-turn GREEN ARROW. Only one of the three colors shall be displayed at any given time.</p> <p>B. During the protected left-turn movement, the shared signal face shall simultaneously display both a CIRCULAR GREEN signal indication and a left-turn GREEN ARROW signal indication.</p> <p>C. The shared signal face shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</p> <p>D. If the protected only mode is not the only left-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.20).</p> <p>Option:</p> <p>A straight-through GREEN ARROW signal indication may be used instead of the CIRCULAR GREEN signal indication in Items</p>	<p>Recommend changing and adding language per fed manual</p>
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<p>CIRCULAR GREEN signal indication in Items A and B in Paragraph 1 on an approach where right turns are prohibited and a straight-through GREEN ARROW signal indication is also used instead of a CIRCULAR GREEN signal indication in the other signal face(s) for through traffic.</p> <p>Standard:</p> <p><del>B. Protected Only Mode—The left turn signal face</del> If a separate left-turn signal face is provided for a protected only mode left turn, it shall meet the following requirements (see Figure 4D-10):</p> <p>A. It shall be capable of displaying, <del>one of</del> the following <del>sets of</del> signal indications: <del>1. steady left turn RED ARROW, steady left turn YELLOW ARROW, and left turn GREEN ARROW.</del> <del>signal indications only. At least one left turn signal face shall be provided in addition to the two approach signal faces required in Section 4D.15 for the major movement.</del> Only one of the three <del>colors</del> indications shall be <del>illuminated</del> displayed at any given time. A signal instruction sign shall not be required with this set of signal indications. If used, it shall be a LEFT ON GREEN ARROW ONLY sign (R10-5) (<del>See Section 2B.45 see figure 2B-27</del>).</p> <p><del>2. CIRCULAR RED, left turn YELLOW ARROW, and left turn GREEN ARROW signal indications. At least one left turn signal face shall be provided in addition to the two approach signal faces required in Section 4D.15 for the major movement, except that if the left turn movement is the major movement no left turn signal faces shall be required in addition to the two approach signal faces required in Section 4D.15 for the major</del></p>	<p>A and B in Paragraph 1 on an approach where right turns are prohibited and a straight-through GREEN ARROW signal indication is also used instead of a CIRCULAR GREEN signal indication in the other signal face(s) for through traffic.</p> <p><b>Standard:</b></p> <p>03 <b>If a separate left-turn signal face is provided for a protected only mode left turn, it shall meet the following requirements (see Figure 4D-10):</b></p> <p><b>A. It shall be capable of displaying, the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time. A signal instruction sign shall not be required with this set of signal indications. If used, it shall be a LEFT ON GREEN ARROW ONLY (R10-5) sign (see Figure 2B-27).</b></p>	<p>A and B in Paragraph 1 on an approach where right turns are prohibited and a straight-through GREEN ARROW signal indication is also used instead of a CIRCULAR GREEN signal indication in the other signal face(s) for through traffic.</p> <p>Standard:</p> <p>If a separate left-turn signal face is provided for a protected only mode left turn, it shall meet the following requirements (see Figure 4D-10):</p> <p>A. It shall be capable of displaying, the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time. A signal instruction sign shall not be required with this set of signal indications. If used, it shall be a LEFT ON GREEN ARROW ONLY sign (R10-5) (see figure 2B-27).</p>	<p>Relocated from 4D.6</p>
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~~movement. Only one of the three colors shall be illuminated at any given time. Unless the CIRCULAR RED signal indication is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s), a LEFT TURN SIGNAL sign (R10-10) (See Section 2B.45) shall be used.~~  
~~3. CIRCULAR RED, CIRCULAR YELLOW, CIRCULAR GREEN, and left turn GREEN ARROW signal indications. This four section signal face shall be used only when the CIRCULAR GREEN and left turn GREEN ARROW signal indications begin and terminate together. During each interval, the circular signal indication shall be the same color as the signal indication on the signal face(s) for the adjacent through traffic.~~

B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.

C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.

D. If the protected 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 and Figures 4D-8 and 4D-12) except that the flashing left-turn YELLOW ARROW or flashing left-turn RED ARROW signal indication shall not be displayed when operating in the protected only mode.

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

Standard:

**B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.**

**C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.**

**D. If the protected 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 and Figures 4D-8 and 4D-12) except that the flashing left-turn YELLOW ARROW or flashing left-turn RED ARROW signal indication shall not be displayed when operating in the protected only mode.**

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

**Standard:**

B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.

C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.

D. If the protected 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 and Figures 4D-8 and 4D-12) except that the flashing left-turn YELLOW ARROW or flashing left-turn RED ARROW signal indication shall not be displayed when operating in the protected only mode.

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

<p><del>C. Protected/Permissive Mode—The signal indications for protected/permissive mode left turns shall be provided in a shared left turn signal face. Any protected/permissive left turn signal face that always simultaneously displays the same color of circular signal indication that the adjacent through signal faces display shall be considered to be a shared left turn signal face, regardless of where the left turn signal face is positioned and regardless of how many adjacent through signal faces are provided. The shared left turn signal face shall be considered an approach signal face, and shall meet the following requirements:</del></p> <p><del>‡</del> If a shared signal face is provided for a protected/permissive mode left turn, it shall meet the following requirements (see Figure 4D-11):</p> <p>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.</p> <p>Only one of the two arrow indications shall be displayed at any given time. If the left-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are always terminated together, the steady left-turn YELLOW ARROW signal indication shall not be required.</p> <p><del>‡</del> B. During the protected left-turn movement, the shared signal face shall simultaneously display a left turn GREEN ARROW signal indication and a circular signal indication that</p>	<p><b>01 If a shared signal face is provided for a protected/permissive mode left turn, it shall meet the following requirements (see Figure 4D-11):</b></p> <p><b>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></p> <p><b>Only one of the two arrow indications shall be displayed at any given time. If the left-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are always terminated together, the steady left-turn YELLOW ARROW signal indication shall not be required.</b></p> <p><b>B. During the protected left-turn movement, the shared signal face shall simultaneously display a leftturn GREEN ARROW signal</b></p>	<p>Movements</p> <p>Standard:</p> <p>If a shared signal face is provided for a protected/permissive mode left turn, it shall meet the following requirements (see Figure 4D-11):</p> <p>A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR green, steady left-turn GREEN ARROW. Only one of the three circular indications shall be displayed at any given time.</p> <p>Only one of the two arrow indications shall be displayed at any given time. If the left-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are always terminated together, the steady left-turn YELLOW ARROW signal indication shall not be required.</p> <p>B. During the protected left-turn movement,</p>	<p>Recommend change with following notes</p> <p>This section note noted as Mn lang., but differs from Fed. Removed in Fed manual</p> <p>Separate left turn signal faces were not allowed for permissive left turn signals in the last MNMUTCD so language differs – Fed changed to not allow this with circular green, only FYA</p>
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<p>is the same color as the signal indication for the adjacent through lane on the same approach as the protected left turn.</p> <p>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. When the left-turn GREEN ARROW and CIRCULAR GREEN signal indications are being terminated together, the required display following the left-turn GREEN ARROW signal indication shall be either the display of a CIRCULAR YELLOW signal indication alone or the simultaneous display of the CIRCULAR YELLOW and left-turn YELLOW ARROW signal indications.</p> <p>D. <del>2.</del> During the permissive left-turn movement, <del>all signal faces on the approach</del> the shared signal face shall display only a CIRCULAR GREEN signal indication<del>s</del>.</p> <p><del>3.</del> E. <del>All signal faces on the approach</del> A protected/permissive shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular signal <del>indications to both through and left turn road users</del> that the adjacent through signal face or faces display.</p> <p><del>4.</del> F. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON GREEN (symbolic circular green <del>ball</del>) (R10-12) sign (see Figure 2B-<del>19</del>27). If a separate left-turn signal face is being operated in a protected/permissive left-turn mode, a CIRCULAR GREEN signal indication</p>	<p><b>indication and a circular signal indication that is the same color as the signal indication for the adjacent through lane on the same approach as the protected left turn.</b></p> <p><b>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. When the left-turn GREEN ARROW and CIRCULAR GREEN signal indications are being terminated together, the required display following the left-turn GREEN ARROW signal indication shall be either the display of a CIRCULAR YELLOW signal indication alone or the simultaneous display of the CIRCULAR YELLOW and left-turn YELLOW ARROW signal indications.</b></p> <p><b>D. During the permissive left-turn movement, the shared signal face shall display only a CIRCULAR GREEN signal indication.</b></p> <p><b>E. A protected/permissive shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</b></p> <p><b>F. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON GREEN (symbolic circular green) (R10-12) sign (see Figure 2B-27).</b></p> <p><b>02 If a separate left-turn signal face is being operated in a protected/permissive left-turn mode, a CIRCULAR GREEN signal</b></p>	<p>the shared signal face shall simultaneously display a left turn GREEN ARROW signal indication and a circular signal indication that is the same color as the signal indication for the adjacent through lane on the same approach as the protected left turn.</p> <p>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. When the left-turn GREEN ARROW and CIRCULAR GREEN signal indications are being terminated together, the required display following the left-turn GREEN ARROW signal indication shall be either the display of a CIRCULAR YELLOW signal indication alone or the simultaneous display of the CIRCULAR YELLOW and left-turn YELLOW ARROW signal indications.</p> <p>D. During the permissive left-turn movement, the shared signal face shall display only a CIRCULAR GREEN signal indication.</p> <p>E. A protected/permissive shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular signal that the adjacent through signal face or faces display.</p> <p>F. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON GREEN (symbolic circular green) (R10-12) sign (see Figure 2B-27). If a separate left-turn signal face is being operated in a protected/permissive left-turn mode, a CIRCULAR GREEN signal indication</p>	<p>Changed for Fed. Manual. Would</p>
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<p>shall not be used in that face.</p> <p>If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a flashing left-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-12):</p> <p>A. It shall be capable of displaying the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, flashing left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the four indications shall be displayed at any given time.</p> <p>B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.</p> <p>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.</p> <p>D. During the permissive left-turn movement, a flashing left-turn YELLOW ARROW signal indication shall be displayed.</p> <p>E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn YELLOW ARROW signal indication if the permissive left-turn movement is being terminated and the separate left-turn signal face will subsequently display a steady left-turn RED ARROW indication.</p> <p>F. It shall be permitted to display a flashing left-turn YELLOW ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p>	<p><b>indication shall not be used in that face.</b></p> <p><b>03 If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a flashing left-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-12):</b></p> <p><b>A. It shall be capable of displaying the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, flashing left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the four indications shall be displayed at any given time.</b></p> <p><b>B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.</b></p> <p><b>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.</b></p> <p><b>D. During the permissive left-turn movement, a flashing left-turn YELLOW ARROW signal indication shall be displayed.</b></p> <p><b>E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn YELLOW ARROW signal indication if the permissive left-turn movement is being terminated and the separate left-turn signal face will subsequently display a steady left-turn RED ARROW indication.</b></p> <p><b>F. It shall be permitted to display a flashing left-turn YELLOW ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications</b></p>	<p>shall not be used in that face.</p> <p>If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a flashing left-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-12):</p> <p>A. It shall be capable of displaying the following signal indications: steady left-turn RED ARROW, steady left-turn YELLOW ARROW, flashing left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the four indications shall be displayed at any given time.</p> <p>B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.</p> <p>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.</p> <p>D. During the permissive left-turn movement, a flashing left-turn YELLOW ARROW signal indication shall be displayed.</p> <p>E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn YELLOW ARROW signal indication if the permissive left-turn movement is being terminated and the separate left-turn signal face will subsequently display a steady left-turn RED ARROW indication.</p> <p>F. It shall be permitted to display a flashing left-turn YELLOW ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p>	<p>like verification of definition of separate left turn phase</p> <p>What is compliance date?</p> <p><b>None</b></p> <p>Would like to add for new or reconstructed signal installations-<b>this is assumed if no compliance date.</b></p>
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<p>G. When a permissive left-turn movement is changing to a protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing left-turn YELLOW ARROW signal indication. A steady left-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing left-turn YELLOW ARROW signal indication and the display of the steady left-turn GREEN ARROW signal indication.</p> <p>H. The display shall be a four-section signal face except that a three-section signal face containing a dual-arrow signal section shall be permitted where signal head height limitations (or lateral positioning limitations for a horizontally-mounted signal face) will not permit the use of a four section signal face. The dual-arrow signal section, where used, shall display a GREEN ARROW for the protected left-turn movement and a flashing YELLOW ARROW for the permissive left-turn movement.</p> <p>I. During steady mode (stop-and-go) operation, the signal section that displays the steady left-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing left-turn YELLOW ARROW signal indication for permissive left turns.</p> <p>J. During flashing mode operation (see Section 4D.30), the display of a flashing left-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady left-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</p>	<p><b>and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</b></p> <p><b>G. When a permissive left-turn movement is changing to a protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing left-turn YELLOW ARROW signal indication. A steady left-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing left-turn YELLOW ARROW signal indication and the display of the steady left-turn GREEN ARROW signal indication.</b></p> <p><b>H. The display shall be a four-section signal face except that a three-section signal face containing a dual-arrow signal section shall be permitted where signal head height limitations (or lateral positioning limitations for a horizontally-mounted signal face) will not permit the use of a four section signal face. The dual-arrow signal section, where used, shall display a GREEN ARROW for the protected left-turn movement and a flashing YELLOW ARROW for the permissive left-turn movement.</b></p> <p><b>I. During steady mode (stop-and-go) operation, the signal section that displays the steady left-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing left-turn YELLOW ARROW signal indication for permissive left turns.</b></p> <p><b>J. During flashing mode operation (see Section 4D.30), the display of a flashing left-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady left-turn YELLOW</b></p>	<p>G. When a permissive left-turn movement is changing to a protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing left-turn YELLOW ARROW signal indication. A steady left-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing left-turn YELLOW ARROW signal indication and the display of the steady left-turn GREEN ARROW signal indication.</p> <p>H. The display shall be a four-section signal face except that a three-section signal face containing a dual-arrow signal section shall be permitted where signal head height limitations (or lateral positioning limitations for a horizontally-mounted signal face) will not permit the use of a four section signal face. The dual-arrow signal section, where used, shall display a GREEN ARROW for the protected left-turn movement and a flashing YELLOW ARROW for the permissive left-turn movement.</p> <p>I. During steady mode (stop-and-go) operation, the signal section that displays the steady left-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing left-turn YELLOW ARROW signal indication for permissive left turns.</p> <p>J. During flashing mode operation (see Section 4D.30), the display of a flashing left-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady left-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</p>	
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<p><b>Option:</b> A separate left-turn signal face with a flashing left-turn RED ARROW signal indication during the permissive left-turn movement may be used for unusual geometric conditions, such as wide medians with offset left-turn lanes, but only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn.</p> <p><b>Standard:</b> If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a flashing left-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-8): A. It shall be capable of displaying the following signal indications: steady or flashing left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time. B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed. C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication. D. During the permissive left-turn movement, a flashing left-turn RED ARROW signal indication shall be displayed. E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn RED ARROW signal indication if the permissive left-turn movement is being terminated and the separate left-turn signal face will subsequently display a steady</p>	<p><b>ARROW signal indication during steady mode (stop-and-go) operation.</b></p> <p><b>Option:</b> 04 A separate left-turn signal face with a flashing left-turn RED ARROW signal indication during the permissive left-turn movement may be used for unusual geometric conditions, such as wide medians with offset left-turn lanes, but only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn.</p> <p><b>Standard:</b> 05 <b>If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a flashing left-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-8):</b> <b>A. It shall be capable of displaying the following signal indications: steady or flashing left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time.</b> <b>B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed.</b> <b>C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication.</b> <b>D. During the permissive left-turn movement, a flashing left-turn RED ARROW signal indication shall be displayed.</b> <b>E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn RED ARROW signal</b></p>	<p><b>Option:</b> A separate left-turn signal face with a flashing left-turn RED ARROW signal indication during the permissive left-turn movement may be used for unusual geometric conditions, such as wide medians with offset left-turn lanes, but only when an engineering study determines that each and every vehicle must successively come to a full stop before making a permissive left turn.</p> <p><b>Standard:</b> If a separate left-turn signal face is being operated in a protected/permissive left-turn mode and a flashing left-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-8): A. It shall be capable of displaying the following signal indications: steady or flashing left-turn RED ARROW, steady left-turn YELLOW ARROW, and left-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time. B. During the protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed. C. A steady left-turn YELLOW ARROW signal indication shall be displayed following the left-turn GREEN ARROW signal indication. D. During the permissive left-turn movement, a flashing left-turn RED ARROW signal indication shall be displayed. E. A steady left-turn YELLOW ARROW signal indication shall be displayed following the flashing left-turn RED ARROW signal indication if the permissive left-turn movement is being terminated and the separate left-turn signal face will subsequently display a steady</p>	
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<p>left-turn RED ARROW indication.</p> <p>F. When a permissive left-turn movement is changing to a protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing left-turn RED ARROW signal indication. A steady left-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing left-turn RED ARROW signal indication and the display of the steady left-turn GREEN ARROW signal indication.</p> <p>G. It shall be permitted to display a flashing left-turn RED ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p> <p>H. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</p> <p><b>Option: Guidance</b> The requirements of Item A in Paragraph 5 above should may be met by a vertically-arranged signal face with a horizontal cluster of two left-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-8).</p>	<p><b>indication if the permissive left-turn movement is being terminated and the separate left-turn signal face will subsequently display a steady left-turn RED ARROW indication.</b></p> <p><b>F. When a permissive left-turn movement is changing to a protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing left-turn RED ARROW signal indication. A steady left-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing left-turn RED ARROW signal indication and the display of the steady left-turn GREEN ARROW signal indication.</b></p> <p><b>G. It shall be permitted to display a flashing left-turn RED ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</b></p> <p><b>H. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</b></p> <p>Option: 06 The requirements of Item A in Paragraph 5 may be met by a vertically-arranged signal face with a horizontal cluster of two left-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-8).</p>	<p>left-turn RED ARROW indication.</p> <p>F. When a permissive left-turn movement is changing to a protected left-turn movement, a left-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing left-turn RED ARROW signal indication. A steady left-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing left-turn RED ARROW signal indication and the display of the steady left-turn GREEN ARROW signal indication.</p> <p>G. It shall be permitted to display a flashing left-turn RED ARROW signal indication for a permissive left-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p> <p>H. A supplementary sign shall not be required. If used, it shall be a LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</p> <p><b>Guidance:</b> The requirements of Item A above should be met by a vertically-arranged signal face with a horizontal cluster of two left-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-8).</p>	<p>Recommend changing option to guidance, removing paragraph lang. and making may should</p>
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~~4D.7~~ 4D.21 ~~Application of Steady~~  
Signal Indications for Right Turns  
Movements –General

**Standard:**  
In Sections 4D.21 through 4D.24, provisions applicable to right-turn movements and right-turn lanes shall also apply to signal indications for U-turns to the right that are provided at locations where right turns are prohibited or not geometrically possible.

SUPPORT  
Right-turning traffic is controlled by one of four modes as follows:  
A. Permissive Only Mode—turns made on ~~the~~ a CIRCULAR GREEN signal indication, a flashing right-turn YELLOW ARROW signal indication, or a flashing right-turn RED ARROW signal indication after yielding to any pedestrians, ~~if any~~.  
B. Protected Only Mode—turns made only when ~~the~~ a right-turn GREEN ARROW signal indication is displayed.  
C. Protected/Permissive Mode—both modes occur on an approach during the same cycle.  
D. Variable Right-Turn Mode—the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during different periods of the day or as traffic conditions change.

**Standard:**  
During a permissive right-turn movement, the signal faces, if any, that exclusively control U-turn traffic that conflicts with the permissive right-turn movement (see Item F.1 in Section

**Section 4D.21 Signal Indications for Right-Turn Movements – General Standard:**

<sup>01</sup> In Sections 4D.21 through 4D.24, provisions applicable to right-turn movements and right-turn lanes shall also apply to signal indications for U-turns to the right that are provided at locations where right turns are prohibited or not geometrically possible.

Support:  
<sup>02</sup> Right-turning traffic is controlled by one of four modes as follows:  
A. Permissive Only Mode—turns made on a CIRCULAR GREEN signal indication, a flashing right-turn YELLOW ARROW signal indication, or a flashing right-turn RED ARROW signal indication after yielding to pedestrians, if any.  
B. Protected Only Mode—turns made only when a right-turn GREEN ARROW signal indication is displayed.  
C. Protected/Permissive Mode—both modes occur on an approach during the same cycle.  
D. Variable Right-Turn Mode—the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during different periods of the day or as traffic conditions change.

**Standard:**  
<sup>03</sup> During a permissive right-turn movement, the signal faces, if any, that exclusively control U-turn traffic that conflicts with the

4D.21 Signal Indications for Right Turn Movements –General

**Standard:**  
In Sections 4D.21 through 4D.24, provisions applicable to right-turn movements and right-turn lanes shall also apply to signal indications for U-turns to the right that are provided at locations where right turns are prohibited or not geometrically possible.

SUPPORT  
Right-turning traffic is controlled by one of four modes as follows:  
A. Permissive Only Mode—turns made on a CIRCULAR GREEN signal indication, a flashing right-turn YELLOW ARROW signal indication, or a flashing right-turn RED ARROW signal indication after yielding to any pedestrians.  
B. Protected Only Mode—turns made only when a right-turn GREEN ARROW signal indication is displayed.  
C. Protected/Permissive Mode—both modes occur on an approach during the same cycle.  
D. Variable Right-Turn Mode—the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during different periods of the day or as traffic conditions change.

**Standard:**  
During a permissive right-turn movement, the signal faces, if any, that exclusively control U-turn traffic that conflicts with the permissive right-turn movement (see Item F.1 in Section 4D.05) shall simultaneously display steady U-

Recommend using fed language except as noted

Change wording from fed manual in bold

<p>4D.05) shall simultaneously display steady U-turn RED ARROW signal indications. If pedestrians crossing the lane or lanes used by the permissive right-turn movement to depart the intersection are controlled by pedestrian signal heads, the signal indications displayed by those pedestrian signal heads shall not be limited to any particular display during the permissive right-turn movement.</p> <p>During a protected right-turn movement, the signal faces for left-turn traffic, if any, on the opposing approach shall not simultaneously display a steady left-turn GREEN ARROW or steady left-turn YELLOW ARROW signal indication, <b>except when terminating a FLASHING YELLOW ARROW or FLASHING RED ARROW</b> and signal faces, if any, that exclusively control U-turn traffic that conflicts with the protected right-turn movement (see Item F.1 in Section 4D.05) shall simultaneously display steady U-turn RED ARROW signal indications. If pedestrians crossing the lane or lanes used by the protected right-turn movement to depart the intersection are controlled by pedestrian signal heads, the pedestrian signal heads shall display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication during the protected right-turn movement.</p> <p>A protected only mode right-turn movement that does not begin and terminate at the same time as the adjacent through movement shall not be provided on an approach unless an exclusive right-turn lane exists.</p> <p>A yellow change interval for the right-turn movement shall not be displayed when the status of the right-turn operation is changing</p>	<p><b>permissive right-turn movement (see Item F.1 in Section 4D.05) shall simultaneously display steady U-turn RED ARROW signal indications. If pedestrians crossing the lane or lanes used by the permissive right-turn movement to depart the intersection are controlled by pedestrian signal heads, the signal indications displayed by those pedestrian signal heads shall not be limited to any particular display during the permissive right-turn movement.</b></p> <p><b>04 During a protected right-turn movement, the signal faces for left-turn traffic, if any, on the opposing approach shall not simultaneously display a steady left-turn GREEN ARROW or steady left-turn YELLOW ARROW signal indication, and signal faces, if any, that exclusively control U-turn traffic that conflicts with the protected right-turn movement (see Item F.1 in Section 4D.05) shall simultaneously display steady U-turn RED ARROW signal indications. If pedestrians crossing the lane or lanes used by the protected right-turn movement to depart the intersection are controlled by pedestrian signal heads, the pedestrian signal heads shall display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication during the protected right-turn movement.</b></p> <p><b>05 A protected only mode right-turn movement that does not begin and terminate at the same time as the adjacent through movement shall not be provided on an approach unless an exclusive right-turn lane exists.</b></p> <p><b>06 A yellow change interval for the right-turn movement shall not be displayed when the status of the right-turn operation is changing from permissive to protected</b></p>	<p>turn RED ARROW signal indications. If pedestrians crossing the lane or lanes used by the permissive right-turn movement to depart the intersection are controlled by pedestrian signal heads, the signal indications displayed by those pedestrian signal heads shall not be limited to any particular display during the permissive right-turn movement.</p> <p>During a protected right-turn movement, the signal faces for left-turn traffic, if any, on the opposing approach shall not simultaneously display a steady left-turn GREEN ARROW or steady left-turn YELLOW ARROW signal indication, <b>except when terminating a FLASHING YELLOW ARROW or FLASHING RED ARROW</b>, and signal faces, if any, that exclusively control U-turn traffic that conflicts with the protected right-turn movement (see Item F.1 in Section 4D.05) shall simultaneously display steady U-turn RED ARROW signal indications. If pedestrians crossing the lane or lanes used by the protected right-turn movement to depart the intersection are controlled by pedestrian signal heads, the pedestrian signal heads shall display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication during the protected right-turn movement.</p> <p>A protected only mode right-turn movement that does not begin and terminate at the same time as the adjacent through movement shall not be provided on an approach unless an exclusive right-turn lane exists.</p> <p>A yellow change interval for the right-turn movement shall not be displayed when the status of the right-turn operation is changing from permissive to protected within any given</p>	<p>Add Mn language to clarify for the FYA as shown in bold. <b>NOTIFY FHWA of error</b> No. see email from Joe G 3-31-11</p>
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<p>from permissive to protected within any given signal sequence.</p> <p><del>D. Variable Right Turn Mode</del>—If the <del>protected only</del> operating mode occurs during <del>one or more periods of the day, and the permissive only mode or the combined protected/permissive mode occurs</del> changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during <del>other</del> different periods of the day or as traffic conditions change, the requirements of <del>Items A, B, and C in this Standard</del> Sections 4D.22 through 4D.24 that are appropriate to that mode of operation shall be met subject to the following:</p> <p><del>1. A.</del> The CIRCULAR GREEN and CIRCULAR YELLOW signal indications shall not be displayed when operating in the protected only mode.</p> <p><del>2. B.</del> The right-turn GREEN ARROW and <b>steady</b> right-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode <b>except that a steady YELLOW ARROW may be displayed to indicate that the flashing YELLOW ARROW or flashing RED ARROW is being terminated.</b></p> <p>OPTION Additional <del>appropriate signal indications</del> static signs or changeable message signs may be used to meet the requirements for the variable right-turn mode <del>or to inform drivers that right-turn green arrows will not be available during certain times of the day.</del></p> <p>Support: Sections 4D.21 through 4D.24 describe the use of the following two types of signal faces for controlling right-turn movements: A. Shared signal face – This type of signal face</p>	<p><b>within any given signal sequence.</b></p> <p><b>07 If the operating mode changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during different periods of the day or as traffic conditions change, the requirements in Sections 4D.22 through 4D.24 that are appropriate to that mode of operation shall be met, subject to the following:</b></p> <p><b>A. The CIRCULAR GREEN and CIRCULAR YELLOW signal indications shall not be displayed when operating in the protected only mode.</b></p> <p><b>B. The right-turn GREEN ARROW and right-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode.</b></p> <p>Option: 08 Additional static signs or changeable message signs may be used to meet the requirements for the variable right-turn mode or to inform drivers that right-turn green arrows will not be available during certain times of the day.</p> <p>Support: 09 Sections 4D.21 through 4D.24 describe the use of the following two 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</p>	<p>signal sequence.</p> <p>If the operating changes among the protected only mode and/or the protected/permissive mode and/or the permissive only mode during different periods of the day or as traffic conditions change, the requirements in Sections 4D.22 through 4D.24 that are appropriate to that mode of operation shall be met subject to the following:</p> <p>A. The CIRCULAR GREEN and CIRCULAR YELLOW signal indications shall not be displayed when operating in the protected only mode.</p> <p>B. The right-turn GREEN ARROW and <b>steady</b> right-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode <b>except that a steady YELLOW ARROW may be displayed to indicate that the flashing YELLOW ARROW or flashing RED ARROW is being terminated.</b></p> <p>OPTION Additional static signs or changeable message signs may be used to meet the requirements for the variable right-turn mode or to inform drivers that right-turn green arrows will not be available during certain times of the day.</p> <p>Support: Sections 4D.21 through 4D.24 describe the use of the following two types of signal faces for controlling right-turn movements: A. Shared signal face – This type of signal face</p>	<p>Add Mn language to clarify for the FYA as shown in bold</p>
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<p>controls both the right-turn movement and the adjacent movement (usually the through movement) and can serve as one of the two required primary signal faces for the adjacent movement. A shared signal face always displays the same color of circular indication that is displayed by the signal face or faces for the adjacent movement.</p> <p>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 primary signal faces for the adjacent movement (usually the through movement) because it displays signal indications that are applicable only to the right-turn movement. If a separate right-turn signal face is mounted overhead at the intersection, it is positioned over the extension of the right-turn lane. 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.</p> <p>Section 4D.13 contains provisions regarding the lateral positioning of signal faces that control right-turn movements.</p> <p>It is not necessary that the same mode of right-turn operation or same type of right-turn signal face be used on every approach to a signalized location. Selecting different modes and types of right-turn signal faces for the various approaches to the same signalized location is acceptable.</p> <p>Option: A signal face that is shared by left-turning and right-turning traffic may be provided for a shared left-turn/right-turn lane on an approach that has no through traffic (see Section 4D.25).</p>	<p>adjacent movement (usually the through movement) and can serve as one of the two required primary signal faces for the adjacent movement. A shared signal face always displays the same color of circular indication that is displayed by the signal face or faces for the adjacent movement.</p> <p>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 primary signal faces for the adjacent movement (usually the through movement) because it displays signal indications that are applicable only to the right-turn movement. If a separate right-turn signal face is mounted overhead at the intersection, it is positioned over the extension of the right-turn lane. 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.</p> <p>10 Section 4D.13 contains provisions regarding the lateral positioning of signal faces that control right-turn movements.</p> <p>11 It is not necessary that the same mode of right-turn operation or same type of right-turn signal face be used on every approach to a signalized location. Selecting different modes and types of right-turn signal faces for the various approaches to the same signalized location is acceptable.</p> <p>Option: 12 A signal face that is shared by left-turning and right-turning traffic may be provided for a shared left-turn/right-turn lane on an approach that has no through traffic (see Section 4D.25).</p>	<p>controls both the right-turn movement and the adjacent movement (usually the through movement) and can serve as one of the two required primary signal faces for the adjacent movement. A shared signal face always displays the same color of circular indication that is displayed by the signal face or faces for the adjacent movement.</p> <p>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 primary signal faces for the adjacent movement (usually the through movement) because it displays signal indications that are applicable only to the right-turn movement. If a separate right-turn signal face is mounted overhead at the intersection, it is positioned over the extension of the right-turn lane. 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.</p> <p>Section 4D.13 contains provisions regarding the lateral positioning of signal faces that control right-turn movements.</p> <p>It is not necessary that the same mode of right-turn operation or same type of right-turn signal face be used on every approach to a signalized location. Selecting different modes and types of right-turn signal faces for the various approaches to the same signalized location is acceptable.</p> <p>Option: A signal face that is shared by left-turning and right-turning traffic may be provided for a shared left-turn/right-turn lane on an approach that has no through traffic (see Section 4D.25).</p>	
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<p>Section 4D.22 Signal Indications for Permissive Only Mode Right-Turn Movements</p> <p>Standard:  <del>The required right turn signal faces and operation for an approach shall be determined by the selected mode of right turn operation, as follows:</del>  <del>A. Permissive Only Mode—A separate signal indication or signal face for right turns shall not be required. The signal indication for permissive only mode right turns shall be the same color as the signal indication for adjacent through traffic, except that if the right turn is held to provide an exclusive pedestrian movement, a separate right turn RED ARROW signal indication shall be provided.</del>  If a shared signal face is provided for a permissive only mode right turn, it shall meet the following requirements (see Figure 4D-13):  A. It shall be capable of displaying 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 right-turn movement, a CIRCULAR GREEN signal indication shall be displayed.  C. A permissive only shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</p>	<p><b>Section 4D.22 Signal Indications for Permissive Only Mode Right-Turn Movements</b></p> <p><b>Standard:</b></p> <p><b>01 If a shared signal face is provided for a permissive only mode right turn, it shall meet the following requirements (see Figure 4D-13):</b>  <b>A. It shall be capable of displaying 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>  <b>B. During the permissive right-turn movement, a CIRCULAR GREEN signal indication shall be displayed.</b>  <b>C. A permissive only shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular indication that the adjacent</b></p>	<p>Section 4D.22 Signal Indications for Permissive Only Mode Right-Turn Movements</p> <p>Standard:</p> <p>If a shared signal face is provided for a permissive only mode right turn, it shall meet the following requirements (see Figure 4D-13):  A. It shall be capable of displaying 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 right-turn movement, a CIRCULAR GREEN signal indication shall be displayed.  C. A permissive only shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.  D. If the permissive only mode is not the only</p>	<p>Relocated from 4D.7</p> <p>Recommend changing per fed with noted exceptions</p>
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<p>D. If the permissive only mode is not the only right-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.24) except that the right-turn GREEN ARROW and right-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode.</p> <p>If a separate right-turn signal face is being operated in a permissive only right-turn mode, a CIRCULAR GREEN signal indication shall not be used in that face.</p> <p>If a separate right-turn signal face is being operated in a permissive only right-turn mode and a flashing right-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-14):</p> <p>A. It shall be capable of displaying one of the following sets of signal indications:</p> <ol style="list-style-type: none"> <li>1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, and flashing right-turn YELLOW ARROW. Only one of the three indications shall be displayed at any given time.</li> <li>2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, and flashing right-turn YELLOW ARROW. Only one of the three indications shall be displayed at any given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or</li> </ol>	<p><b>through signal face or faces display.</b></p> <p><b>D. If the permissive only mode is not the only right-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.24) except that the right-turn GREEN ARROW and right-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode.</b></p> <p><b>02 If a separate right-turn signal face is being operated in a permissive only right-turn mode, a CIRCULAR GREEN signal indication shall not be used in that face.</b></p> <p><b>03 If a separate right-turn signal face is being operated in a permissive only right-turn mode and a flashing right-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-14):</b></p> <p><b>A. It shall be capable of displaying one of the following sets of signal indications:</b></p> <ol style="list-style-type: none"> <li><b>1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, and flashing right-turn YELLOW ARROW. Only one of the three indications shall be displayed at any given time.</b></li> <li><b>2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, and flashing right-turn YELLOW ARROW. Only one of the three indications shall be displayed at any given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the</b></li> </ol>	<p>right-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.24) except that the right-turn GREEN ARROW and right-turn YELLOW ARROW signal indications shall not be displayed when operating in the permissive only mode.</p> <p>If a separate right-turn signal face is being operated in a permissive only right-turn mode, a CIRCULAR GREEN signal indication shall not be used in that face.</p> <p>If a separate right-turn signal face is being operated in a permissive only right-turn mode and a flashing right-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-14):</p> <p>A. It shall be capable of displaying one of the following sets of signal indications:</p> <ol style="list-style-type: none"> <li>1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, and flashing right-turn YELLOW ARROW. Only one of the three indications shall be displayed at any given time.</li> <li>2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, and flashing right-turn YELLOW ARROW. Only one of the three indications shall be displayed at any given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to</li> </ol>	
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<p>designed such that it is not readily visible to drivers in the through lane(s).</p> <p>B. During the permissive right-turn movement, a flashing right-turn YELLOW ARROW signal indication shall be displayed.</p> <p>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn YELLOW ARROW signal indication.</p> <p>D. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted (except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</p> <p>E. It shall be permitted to display a flashing right-turn YELLOW ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications.</p> <p>F. During steady mode (stop-and-go) operation, the signal section that displays the steady right-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing right-turn YELLOW ARROW signal indication for permissive right turns.</p> <p>G. During flashing mode operation (see Section 4D.30), the display of a flashing right-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady right-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</p>	<p><b>separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).</b></p> <p><b>B. During the permissive right-turn movement, a flashing right-turn YELLOW ARROW signal indication shall be displayed.</b></p> <p><b>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn YELLOW ARROW signal indication.</b></p> <p><b>D. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted (except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</b></p> <p><b>E. It shall be permitted to display a flashing right-turn YELLOW ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications.</b></p> <p><b>F. During steady mode (stop-and-go) operation, the signal section that displays the steady right-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing right-turn YELLOW ARROW signal indication for permissive right turns.</b></p> <p><b>G. During flashing mode operation (see Section 4D.30), the display of a flashing right-turn YELLOW ARROW signal indication shall be only from the signal</b></p>	<p>drivers in the through lane(s).</p> <p>B. During the permissive right-turn movement, a flashing right-turn YELLOW ARROW signal indication shall be displayed.</p> <p>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn YELLOW ARROW signal indication.</p> <p>D. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</p> <p>E. It shall be permitted to display a flashing right-turn YELLOW ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications.</p> <p>F. During steady mode (stop-and-go) operation, the signal section that displays the steady right-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing right-turn YELLOW ARROW signal indication for permissive right turns.</p> <p>G. During flashing mode operation (see Section 4D.30), the display of a flashing right-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady right-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</p> <p>H. If the permissive only mode is not the only right-turn mode used for the approach, the signal face shall be the same separate right-turn signal face with a flashing YELLOW ARROW</p>	<p>Remove if removed earlier</p>
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<p>H. If the permissive only mode is not the only right-turn mode used for the approach, the signal face shall be the same separate right-turn signal face with a flashing YELLOW ARROW signal indication that is used for the protected/permissive mode (see Section 4D.24) except that the right-turn GREEN ARROW signal indication shall not be displayed when operating in the permissive only mode.</p> <p>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 during the permissive right-turn movement may be used.</p> <p>Standard: If a separate right-turn signal face is being operated in a permissive only right-turn mode and a flashing right-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-15): A. It shall be capable of displaying one of the following sets of signal indications: 1. Steady or flashing right-turn RED ARROW, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time. The GREEN ARROW indication is required in order to provide a three-section signal face, but shall not be displayed during permissive only mode. 2. Steady CIRCULAR RED on the left and steady right-turn RED ARROW on the right of the top position, steady right-turn YELLOW ARROW in the middle position, and right-turn GREEN ARROW in the bottom position. Only</p>	<p><b>section that displays a steady right-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</b> <b>H. If the permissive only mode is not the only right-turn mode used for the approach, the signal face shall be the same separate right-turn signal face with a flashing YELLOW ARROW signal indication that is used for the protected/permissive mode (see Section 4D.24) except that the right-turn GREEN ARROW signal indication shall not be displayed when operating in the permissive only mode.</b></p> <p>Option: 04 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 during the permissive right-turn movement may be used.</p> <p><b>Standard:</b> 05 <b>If a separate right-turn signal face is being operated in a permissive only right-turn mode and a flashing right-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-15):</b> <b>A. It shall be capable of displaying one of the following sets of signal indications:</b> <b>1. Steady or flashing right-turn RED ARROW, steady right-turn YELLOW ARROW, and rightturn GREEN ARROW. Only one of the three indications shall be displayed at any given time. The GREEN ARROW indication is required in order to provide a three-section signal face, but shall not be displayed during permissive only mode.</b> <b>2. Steady CIRCULAR RED on the left and</b></p>	<p>signal indication that is used for the protected/permissive mode (see Section 4D.24) except that the right-turn GREEN ARROW signal indication shall not be displayed when operating in the permissive only mode.</p> <p>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 during the permissive right-turn movement may be used.</p> <p>Standard: If a separate right-turn signal face is being operated in a permissive only right-turn mode and a flashing right-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-15): A. It shall be capable of displaying one of the following sets of signal indications: 1. Steady or flashing right-turn RED ARROW, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time. The GREEN ARROW indication is required in order to provide a three-section signal face, but shall not be displayed during permissive only mode. 2. Steady CIRCULAR RED on the left and steady right-turn RED ARROW on the right of</p>	
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<p>one of the four indications shall be displayed at any given time. The GREEN ARROW indication is required in order to provide three vertical positions, but shall not be displayed during permissive only mode. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).</p> <p>B. During the permissive right-turn movement, a flashing right-turn RED ARROW signal indication shall be displayed, thus indicating that each and every vehicle must successively come to a full stop before making a permissive right turn.</p> <p>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn RED ARROW signal indication.</p> <p>D. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted (except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</p> <p>E. The display of a flashing right-turn RED ARROW signal indication for a permissive right-turn movement while the signal faces for</p>	<p><b>steady right-turn RED ARROW on the right of the top position, steady right-turn YELLOW ARROW in the middle position, and right-turn GREEN ARROW in the bottom position. Only one of the four indications shall be displayed at any given time. The GREEN ARROW indication is required in order to provide three vertical positions, but shall not be displayed during permissive only mode. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).</b></p> <p><b>B. During the permissive right-turn movement, a flashing right-turn RED ARROW signal indication shall be displayed, thus indicating that each and every vehicle must successively come to a full stop before making a permissive right turn.</b></p> <p><b>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn RED ARROW signal indication.</b></p> <p><b>D. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted (except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication) or</b></p>	<p>the top position, steady right-turn YELLOW ARROW in the middle position, and right-turn GREEN ARROW in the bottom position. Only one of the four indications shall be displayed at any given time. The GREEN ARROW indication is required in order to provide three vertical positions, but shall not be displayed during permissive only mode. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).</p> <p>B. During the permissive right-turn movement, a flashing right-turn RED ARROW signal indication shall be displayed, thus indicating that each and every vehicle must successively come to a full stop before making a permissive right turn.</p> <p>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn RED ARROW signal indication.</p> <p>D. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</p> <p>E. The display of a flashing right-turn RED ARROW signal indication for a permissive right-turn movement while the signal faces for</p>	<p>Remove if removed earlier</p>
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<p>the adjacent through movement display steady 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.</p> <p>F. A supplementary sign shall not be required. If used, it shall be a RIGHT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</p> <p><b>Option Guidance:</b> The requirements of Item A.1 in Paragraph 5 may above should be met by a vertically-arranged signal face with a horizontal cluster of two right-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-15).</p> <p>Section 4D.23 Signal Indications for Protected Only Mode Right-Turn Movements Standard: A shared signal face shall not be used for protected only mode right turns unless the CIRCULAR GREEN and right-turn GREEN ARROW signal indications always begin and terminate together. If a shared signal face is provided for a protected only right turn, it shall meet the following requirements (see Figure 4D-16): A. It shall be capable of displaying the</p>	<p>a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</p> <p><b>E. The display of a flashing right-turn RED ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady 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.</b></p> <p><b>F. A supplementary sign shall not be required. If used, it shall be a RIGHT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</b></p> <p>Option: 06 The requirements of Item A.1 in Paragraph 5 may be met by a vertically-arranged signal face with a horizontal cluster of two right-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-15).</p> <p><b>Section 4D.23 Signal Indications for Protected Only Mode Right-Turn Movements</b> <b>Standard:</b> 01 <b>A shared signal face shall not be used for protected only mode right turns unless the CIRCULAR GREEN and right-turn GREEN ARROW signal indications always begin and terminate together. If a shared signal face is provided for a protected only right turn, it shall meet the</b></p>	<p>the adjacent through movement display steady 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.</p> <p>F. A supplementary sign shall not be required. If used, it shall be a RIGHT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</p> <p><b>Guidance:</b> The requirements of Item A.1 above should be met by a vertically-arranged signal face with a horizontal cluster of two right-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-15).</p> <p>Section 4D.23 Signal Indications for Protected Only Mode Right-Turn Movements Standard: A shared signal face shall not be used for protected only mode right turns unless the CIRCULAR GREEN and right-turn GREEN ARROW signal indications always begin and terminate together. If a shared signal face is provided for a protected only right turn, it shall meet the following requirements (see Figure 4D-16):</p>	<p>Change option to guidance and may to should</p>
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<p>following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR GREEN, and right-turn GREEN ARROW. Only one of the three colors shall be displayed at any given time.</p> <p>B. During the protected right-turn movement, the shared signal face shall simultaneously display both a CIRCULAR GREEN signal indication and a right-turn GREEN ARROW signal indication.</p> <p>C. The shared signal face shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</p> <p>D. If the protected only mode is not the only right-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.24).</p> <p>Option: A straight-through GREEN ARROW signal indication may be used instead of the CIRCULAR GREEN signal indication in Items A and B in Paragraph 1 above on an approach where left turns are prohibited and a straight-through GREEN ARROW signal indication is also used instead of a CIRCULAR GREEN signal indication in the other signal face(s) for through traffic.</p> <p>Standard <del>B. Protected Only Mode—The</del> If a separate right-turn signal face is provided for a protected only mode right turn, it shall meet the following requirements (see Figure 4D-17): A. It shall be capable of displaying one of the following sets of signal indications: 1. Steady right<del>Right</del>-turn RED ARROW,</p>	<p><b>following requirements (see Figure 4D-16):</b> <b>A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR GREEN, and right-turn GREEN ARROW. Only one of the three colors shall be displayed at any given time.</b> <b>B. During the protected right-turn movement, the shared signal face shall simultaneously display both a CIRCULAR GREEN signal indication and a right-turn GREEN ARROW signal indication.</b> <b>C. The shared signal face shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</b> <b>D. If the protected only mode is not the only right-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.24).</b></p> <p>Option: 02 A straight-through GREEN ARROW signal indication may be used instead of the CIRCULAR GREEN signal indication in Items A and B in Paragraph 1 on an approach where left turns are prohibited and a straight-through GREEN ARROW signal indication is also used instead of a CIRCULAR GREEN signal indication in the other signal face(s) for through traffic.</p> <p><b>Standard:</b> 03 <b>If a separate right-turn signal face is provided for a protected only mode right turn, it shall meet the following requirements (see Figure 4D-17):</b> <b>A. It shall be capable of displaying one of the following sets of signal indications:</b></p>	<p>A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR GREEN, and right-turn GREEN ARROW. Only one of the three colors shall be displayed at any given time.</p> <p>B. During the protected right-turn movement, the shared signal face shall simultaneously display both a CIRCULAR GREEN signal indication and a right-turn GREEN ARROW signal indication.</p> <p>C. The shared signal face shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</p> <p>D. If the protected only mode is not the only right-turn mode used for the approach, the signal face shall be the same shared signal face that is used for the protected/permissive mode (see Section 4D.24).</p> <p>Option: A straight-through GREEN ARROW signal indication may be used instead of the CIRCULAR GREEN signal indication in Items A and B above on an approach where left turns are prohibited and a straight-through GREEN ARROW signal indication is also used instead of a CIRCULAR GREEN signal indication in the other signal face(s) for through traffic.</p> <p>Standard: If a separate right-turn signal face is provided for a protected only mode right turn, it shall meet the following requirements (see Figure 4D-17): A. It shall be capable of displaying one of the following sets of signal indications: 1. Steady right-turn RED ARROW, steady</p>	<p>Parts relocated from 4D.7</p> <p>Recommend changing per fed changes</p> <p>Remove paragraph lang.</p>
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<p><del>steady right-turn YELLOW ARROW, and right-turn GREEN ARROW signal indications only. At least one right turn signal face shall be provided in addition to the two approach signal faces required in Section 4D.15 for the major movement.</del> Only one of the three colors indications shall be illuminated displayed at any given time. A signal instruction sign shall not be required with this set of signal indications. If used, it shall be a RIGHT ON GREEN ARROW ONLY sign (R10-5a) (See Figure 2B-27) (See Section 2B.45).</p> <p>2. <del>Steady CIRCULAR RED, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW signal indications. At least one right-turn signal face shall be provided in addition to the two approach signal faces required in Section 4D.15 for the major movement.</del> Only one of three colors indications shall be illuminated displayed at any given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lanes(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (See Figure 2B-27) shall be used unless Unless the CIRCULAR RED signal indication is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s), a RIGHT TURN SIGNAL sign (R10-10R) (See Section 2B.45) shall be used.</p> <p><del>3. CIRCULAR RED, CIRCULAR YELLOW, CIRCULAR GREEN, and right-turn GREEN ARROW signal indications. This four section signal face shall be used only when the CIRCULAR GREEN and right-turn GREEN ARROW signal indications begin and terminate together. During each interval, the circular signal indication shall be the same</del></p>	<p><b>1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time. A signal instruction sign shall not be required with this set of signal indications. If used, it shall be a RIGHT ON GREEN ARROW ONLY (R10-5a) sign (see Figure 2B-27).</b></p> <p><b>2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of three indications shall be displayed at any given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).</b></p>	<p>right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time. A signal instruction sign shall not be required with this set of signal indications. If used, it shall be a RIGHT ON GREEN ARROW ONLY sign (R10-5a) (See Figure 2B-27) (See Section 2B.45).</p> <p>2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, and right-turn GREEN. Only one of three indications shall be displayed at any given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lanes(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (See Figure 2B-27) shall be used unless the CIRCULAR RED signal indication is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).</p>	<p>Mn language referring to section – what is there now?</p>
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color as the signal indication on the signal faces for the adjacent through traffic.

B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed.

C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication.

D. When the separate signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted ~~except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication~~ or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.

E. If the protected only mode is not the only right-turn mode used for the approach, the signal face shall be the same separate right-turn signal face that is used for the protected/permissive mode (see Section 4D.24 and Figure 4D-19) except that a flashing right-turn YELLOW ARROW or flashing right-turn RED ARROW signal indication shall not be displayed when operating in the protected only mode.

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

**Standard:**

~~C. If a shared Protected/Permissive Mode—A~~

- B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed.**
- C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication.**
- D. When the separate signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted (except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.**
- E. If the protected only mode is not the only right-turn mode used for the approach, the signal face shall be the same separate right-turn signal face that is used for the protected/permissive mode (see Section 4D.24 and Figure 4D-19) except that a flashing right-turn YELLOW ARROW or flashing right-turn RED ARROW signal indication shall not be displayed when operating in the protected only mode.**

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

**Standard:**

- B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed.
- C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication.
- D. When the separate signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.
- E. If the protected only mode is not the only right-turn mode used for the approach, the signal face shall be the same separate right-turn signal face that is used for the protected/permissive mode (see Section 4D.24 and Figure 4D-19) except that a flashing right-turn YELLOW ARROW or flashing right-turn RED ARROW signal indication shall not be displayed when operating in the protected only mode.

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

**Standard:**

If a shared signal face provided for a protected/permissive mode right turn, it shall

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<p><del>separate</del> signal face is <del>not required for the right turn, but, if</del> provided for a protected/permissive mode right turn, it shall <del>be considered an approach signal face, and shall</del> meet the following requirements (see Figure 4D-18):</p> <p>A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR green, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the three circular indications shall be displayed at any given time. Only one of the two arrow indications shall be displayed at any given time. If the right-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are always terminated together, the steady right-turn YELLOW ARROW signal indication shall not be required.</p> <p><del>+</del> B. During the protected right-turn movement, the <del>shared</del> signal face shall simultaneously display <del>-(a)-</del> A a right-turn GREEN ARROW signal indication, and <del>(b)-</del> A a circular signal indication that is the same color as the signal indication for the adjacent through lane on the same approach as the protected right turn.</p> <p>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication, unless the right-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are being terminated together. When the right-turn GREEN ARROW and CIRCULAR GREEN</p>	<p><b>01 If a shared signal face is provided for a protected/permissive mode right turn, it shall meet the following requirements (see Figure 4D-18):</b></p> <p><b>A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR green, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the three circular indications shall be displayed at any given time. Only one of the two arrow indications shall be displayed at any given time. If the right-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are always terminated together, the steady right-turn YELLOW ARROW signal indication shall not be required.</b></p> <p><b>B. During the protected right-turn movement, the shared signal face shall simultaneously display a right-turn GREEN ARROW signal indication and a circular signal indication that is the same color as the signal indication for the adjacent through lane on the same approach as the protected right turn.</b></p> <p><b>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the rightturn GREEN ARROW signal indication, unless the right-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are being terminated together. When the right-turn GREEN ARROW and CIRCULAR GREEN signal indications are being terminated</b></p>	<p>meet the following requirements (see Figure 4D-18):</p> <p>A. It shall be capable of displaying the following signal indications: steady CIRCULAR RED, steady CIRCULAR YELLOW, CIRCULAR green, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the three circular indications shall be displayed at any given time. Only one of the two arrow indications shall be displayed at any given time. If the right-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are always terminated together, the steady right-turn YELLOW ARROW signal indication shall not be required.</p> <p>B. During the protected right-turn movement, the shared signal face shall simultaneously display a right-turn GREEN ARROW signal indication and a circular signal indication that is the same color as the signal indication for the adjacent through lane on the same approach as the protected right turn.</p> <p>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication, unless the right-turn GREEN ARROW signal indication and the CIRCULAR GREEN signal indication(s) for the adjacent through movement are being terminated together. When the right-turn GREEN ARROW and CIRCULAR GREEN signal indications are being terminated together, the required display following the right-turn GREEN ARROW signal indication</p>	<p>Recommend changing per fed manual with exceptions as noted</p>
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<p>signal indications are being terminated together, the required display following the right-turn GREEN ARROW signal indication shall be either the display of a CIRCULAR YELLOW signal indication alone or the simultaneous display of the CIRCULAR YELLOW and right-turn YELLOW ARROW signal indications.</p> <p><del>2.</del> D. During the permissive right-turn movement, <del>all signal faces on the approach</del> the shared signal face shall display only a CIRCULAR GREEN signal indication.</p> <p><del>3.</del> E. <del>All signal faces on the approach</del> A protected/permissive shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular signal <del>indications to both through and right-turn road users</del> that the adjacent through signal face or faces display.</p> <p>If a separate right-turn signal face is being operated in a protected/permissive right-turn mode, a CIRCULAR GREEN signal indication shall not be used in that face.</p> <p>If a separate right-turn signal face is being operated in a protected/permissive right-turn mode and a flashing right-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-19):</p> <p>A. It shall be capable of displaying one of the following sets of signal indications:</p> <ol style="list-style-type: none"> <li>1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, flashing right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the four</li> </ol>	<p><b>together, the required display following the right-turn GREEN ARROW signal indication shall be either the display of a CIRCULAR YELLOW signal indication alone or the simultaneous display of the CIRCULAR YELLOW and right-turn YELLOW ARROW signal indications.</b></p> <p><b>D. During the permissive right-turn movement, the shared signal face shall display only a CIRCULAR GREEN signal indication.</b></p> <p><b>E. A protected/permissive shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular indication that the adjacent through signal face or faces display.</b></p> <p><b>02 If a separate right-turn signal face is being operated in a protected/permissive right-turn mode, a CIRCULAR GREEN signal indication shall not be used in that face.</b></p> <p><b>03 If a separate right-turn signal face is being operated in a protected/permissive right-turn mode and a flashing right-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-19):</b></p> <p><b>A. It shall be capable of displaying one of the following sets of signal indications:</b></p> <ol style="list-style-type: none"> <li><b>1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, flashing right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the four indications shall be displayed at any given time.</b></li> <li><b>2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, flashing right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the four</b></li> </ol>	<p>shall be either the display of a CIRCULAR YELLOW signal indication alone or the simultaneous display of the CIRCULAR YELLOW and right-turn YELLOW ARROW signal indications.</p> <p>D. During the permissive right-turn movement, the shared signal face shall display only a CIRCULAR GREEN signal indication.</p> <p>E. A protected/permissive shared signal face, regardless of where it is positioned and regardless of how many adjacent through signal faces are provided, shall always simultaneously display the same color of circular signal that the adjacent through signal face or faces display.</p> <p>If a separate right-turn signal face is being operated in a protected/permissive right-turn mode, a CIRCULAR GREEN signal indication shall not be used in that face.</p> <p>If a separate right-turn signal face is being operated in a protected/permissive right-turn mode and a flashing right-turn yellow arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-19):</p> <p>A. It shall be capable of displaying one of the following sets of signal indications:</p> <ol style="list-style-type: none"> <li>1. Steady right-turn RED ARROW, steady right-turn YELLOW ARROW, flashing right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the four indications shall be displayed at any given time.</li> <li>2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, flashing right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the four indications shall be displayed at any given time. If the</li> </ol>	
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<p>indications shall be displayed at any given time.</p> <p>2. Steady CIRCULAR RED, steady right-turn YELLOW ARROW, flashing right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the four indications shall be displayed at any given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).</p> <p>B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed.</p> <p>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication.</p> <p>D. During the permissive right-turn movement, a flashing right-turn YELLOW ARROW signal indication shall be displayed.</p> <p>E. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn YELLOW ARROW signal indication if the permissive right-turn movement is being terminated and the separate right-turn signal face will subsequently display a steady red indication.</p> <p>F. When a permissive right-turn movement is changing to a protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing right-turn</p>	<p><b>indications shall be displayed at any given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).</b></p> <p><b>B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed.</b></p> <p><b>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication.</b></p> <p><b>D. During the permissive right-turn movement, a flashing right-turn YELLOW ARROW signal indication shall be displayed.</b></p> <p><b>E. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn YELLOW ARROW signal indication if the permissive right-turn movement is being terminated and the separate right-turn signal face will subsequently display a steady red indication.</b></p> <p><b>F. When a permissive right-turn movement is changing to a protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing right-turn YELLOW ARROW signal indication. A steady right-turn YELLOW ARROW signal indication shall not be displayed between the display of</b></p>	<p>CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).</p> <p>B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed.</p> <p>C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication.</p> <p>D. During the permissive right-turn movement, a flashing right-turn YELLOW ARROW signal indication shall be displayed.</p> <p>E. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn YELLOW ARROW signal indication if the permissive right-turn movement is being terminated and the separate right-turn signal face will subsequently display a steady red indication.</p> <p>F. When a permissive right-turn movement is changing to a protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing right-turn YELLOW ARROW signal indication. A steady right-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing right-turn YELLOW ARROW signal indication and the display of the steady right-turn GREEN ARROW signal indication.</p>	
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<p>YELLOW ARROW signal indication. A steady right-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing right-turn YELLOW ARROW signal indication and the display of the steady right-turn GREEN ARROW signal indication.</p> <p>G. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted <del>(except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication)</del> or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</p> <p>H. It shall be permitted to display a flashing right-turn YELLOW ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications.</p> <p>I. A signal face containing a dual-arrow signal section in place of separate flashing right-turn YELLOW ARROW and right-turn GREEN ARROW signal sections shall be permitted where signal head height limitations (or lateral positioning limitations for a horizontally-mounted signal face) are a concern. The dual-arrow signal section, where used, shall display a GREEN ARROW for the protected right-turn movement and a flashing YELLOW ARROW for the permissive right-turn movement.</p> <p>J. During steady mode (stop-and-go) operation, the signal section that displays the steady right-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing right-turn YELLOW</p>	<p><b>the flashing right-turn YELLOW ARROW signal indication and the display of the steady right-turn GREEN ARROW signal indication.</b></p> <p><b>G. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted (except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</b></p> <p><b>H. It shall be permitted to display a flashing right-turn YELLOW ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications.</b></p> <p><b>I. A signal face containing a dual-arrow signal section in place of separate flashing right-turn YELLOW ARROW and right-turn GREEN ARROW signal sections shall be permitted where signal head height limitations (or lateral positioning limitations for a horizontally-mounted signal face) are a concern. The dual-arrow signal section, where used, shall display a GREEN ARROW for the protected right-turn movement and a flashing YELLOW ARROW for the permissive right-turn movement.</b></p> <p><b>J. During steady mode (stop-and-go) operation, the signal section that displays the steady right-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing right-turn YELLOW ARROW signal</b></p>	<p>G. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</p> <p>H. It shall be permitted to display a flashing right-turn YELLOW ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications.</p> <p>I. A signal face containing a dual-arrow signal section in place of separate flashing right-turn YELLOW ARROW and right-turn GREEN ARROW signal sections shall be permitted where signal head height limitations (or lateral positioning limitations for a horizontally-mounted signal face) are a concern. The dual-arrow signal section, where used, shall display a GREEN ARROW for the protected right-turn movement and a flashing YELLOW ARROW for the permissive right-turn movement.</p> <p>J. During steady mode (stop-and-go) operation, the signal section that displays the steady right-turn YELLOW ARROW signal indication during change intervals shall not be used to display the flashing right-turn YELLOW ARROW signal indication for permissive right turns.</p> <p>K. During flashing mode operation (see Section 4D.30), the display of a flashing right-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady right-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</p>	<p>Remove if removed earlier</p>
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<p>ARROW signal indication for permissive right turns.</p> <p>K. During flashing mode operation (see Section 4D.30), the display of a flashing right-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady right-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</p> <p>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 signal face that has a flashing right-turn RED ARROW signal indication during the permissive right-turn movement may be used.</p> <p>Standard: If a separate right-turn signal face is being operated in a protected/permissive right-turn mode and a flashing right-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-15): A. It shall be capable of displaying one of the following sets of signal indications: 1. Steady <b>right-turn RED ARROW</b>, <del>or</del> flashing right-turn RED ARROW, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the <del>three-four</del> indications shall be displayed at any given time. 2. Steady CIRCULAR RED, <b>or steady RED ARROW</b> on the left and <del>steady or</del> flashing right-turn RED ARROW on the right of the top position, steady right-turn YELLOW ARROW in the middle position, and right-turn GREEN ARROW in the bottom position. Only one of the four indications shall be displayed at any</p>	<p><b>indication for permissive right turns.</b></p> <p><b>K. During flashing mode operation (see Section 4D.30), the display of a flashing right-turn YELLOW ARROW signal indication shall be only from the signal section that displays a steady right-turn YELLOW ARROW signal indication during steady mode (stop-and-go) operation.</b></p> <p>Option: 04 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 signal face that has a flashing right-turn RED ARROW signal indication during the permissive right-turn movement may be used.</p> <p><b>Standard:</b> 05 <b>If a separate right-turn signal face is being operated in a protected/permissive right-turn mode and a flashing right-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-15):</b> <b>A. It shall be capable of displaying one of the following sets of signal indications:</b> <b>1. Steady or flashing right-turn RED ARROW, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the three indications shall be displayed at any given time.</b> <b>2. Steady CIRCULAR RED on the left and steady or flashing right-turn RED ARROW on the right of the top position, steady right-turn YELLOW ARROW in the middle position, and right-turn GREEN ARROW in the bottom position. Only one of the four indications shall be displayed at any given time. If the CIRCULAR RED signal</b></p>	<p>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 signal face that has a flashing right-turn RED ARROW signal indication during the permissive right-turn movement may be used.</p> <p>Standard: If a separate right-turn signal face is being operated in a protected/permissive right-turn mode and a flashing right-turn RED arrow signal indication is provided, it shall meet the following requirements (see Figure 4D-15): A. It shall be capable of displaying one of the following sets of signal indications: 1. Steady <b>right-turn RED ARROW</b>, <del>or</del> flashing right-turn RED ARROW, steady right-turn YELLOW ARROW, and right-turn GREEN ARROW. Only one of the <b>four</b> indications shall be displayed at any given time. 2. Steady CIRCULAR RED, <b>or steady RED ARROW</b> on the left and flashing right-turn RED ARROW on the right of the top position, steady right-turn YELLOW ARROW in the middle position, and right-turn GREEN ARROW in the bottom position. Only one of the four indications shall be displayed at any</p>	<p>This doesn't match figure 4D-15 <b>Need to let feds know of error</b></p>
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given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).

B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed.

C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication.

D. During the permissive right-turn movement, the separate right-turn signal face shall display a flashing right-turn RED ARROW signal indication.

E. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn RED ARROW signal indication if the permissive right-turn movement is being terminated and the separate right-turn signal face will subsequently display a steady red indication.

F. When a permissive right-turn movement is changing to a protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing right-turn RED ARROW signal indication. A steady right-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing right-turn RED ARROW signal indication and the display of the steady right-turn GREEN ARROW signal indication.

**indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).**

**B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed.**

**C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication.**

**D. During the permissive right-turn movement, the separate right-turn signal face shall display a flashing right-turn RED ARROW signal indication.**

**E. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn RED ARROW signal indication if the permissive right-turn movement is being terminated and the separate right-turn signal face will subsequently display a steady red indication.**

**F. When a permissive right-turn movement is changing to a protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing right-turn RED ARROW signal indication. A steady right-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing right-turn RED ARROW signal indication**

given time. If the CIRCULAR RED signal indication is sometimes displayed when the signal faces for the adjacent through lane(s) are not displaying a CIRCULAR RED signal indication, a RIGHT TURN SIGNAL (R10-10R) sign (see Figure 2B-27) shall be used unless the CIRCULAR RED signal indication in the separate right-turn signal face is shielded, hooded, louvered, positioned, or designed such that it is not readily visible to drivers in the through lane(s).

B. During the protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed.

C. A steady right-turn YELLOW ARROW signal indication shall be displayed following the right-turn GREEN ARROW signal indication.

D. During the permissive right-turn movement, the separate right-turn signal face shall display a flashing right-turn RED ARROW signal indication.

E. A steady right-turn YELLOW ARROW signal indication shall be displayed following the flashing right-turn RED ARROW signal indication if the permissive right-turn movement is being terminated and the separate right-turn signal face will subsequently display a steady red indication.

F. When a permissive right-turn movement is changing to a protected right-turn movement, a right-turn GREEN ARROW signal indication shall be displayed immediately upon the termination of the flashing right-turn RED ARROW signal indication. A steady right-turn YELLOW ARROW signal indication shall not be displayed between the display of the flashing right-turn RED ARROW signal indication and the display of the steady right-turn GREEN ARROW signal indication.

<p>G. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted <del>(except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication)</del> or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</p> <p>H. It shall be permitted to display a flashing right-turn RED ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p> <p>I. A supplementary sign shall not be required. If used, it shall be a RIGHT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</p> <p><del>Option-Guidance:</del> The requirements of Item A.1 <del>in Paragraph 5</del> <b>may above should</b> be met by a vertically-arranged signal face with a horizontal cluster of two right-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-15).</p> <p><b>Section 4D.25 Signal Indications for Approaches With Shared Left-Turn/Right-Turn Lanes and</b></p>	<p><b>and the display of the steady right-turn GREEN ARROW signal indication.</b></p> <p><b>G. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted (except when a traffic control device is in place permitting a turn on a steady RED ARROW signal indication) or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</b></p> <p><b>H. It shall be permitted to display a flashing right-turn RED ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</b></p> <p><b>I. A supplementary sign shall not be required. If used, it shall be a RIGHT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</b></p> <p>Option: 06 The requirements of Item A.1 in Paragraph 5 may be met by a vertically-arranged signal face with a horizontal cluster of two right-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-15).</p> <p><b>Section 4D.25 Signal Indications for Approaches With Shared Left-Turn/Right-Turn Lanes and</b></p>	<p>G. When the separate right-turn signal face is providing a message to stop and remain stopped, a steady right-turn RED ARROW signal indication shall be displayed if it is intended that right turns on red not be permitted or a steady CIRCULAR RED signal indication shall be displayed if it is intended that right turns on red be permitted.</p> <p>H. It shall be permitted to display a flashing right-turn RED ARROW signal indication for a permissive right-turn movement while the signal faces for the adjacent through movement display steady CIRCULAR RED signal indications and the opposing left-turn signal faces display left-turn GREEN ARROW signal indications for a protected left-turn movement.</p> <p>I. A supplementary sign shall not be required. If used, it shall be a RIGHT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign (see Figure 2B-27).</p> <p><b>Guidance:</b> The requirements of Item A.1 <b>above should</b> be met by a vertically-arranged signal face with a horizontal cluster of two right-turn RED ARROW signal indications, the left-most of which displays a steady indication and the right-most of which displays a flashing indication (see Figure 4D-15).</p> <p><b>Section 4D.25 Signal Indications for Approaches With Shared Left-Turn/Right-Turn Lanes and No Through Movement</b> Support:</p>	<p>Remove if removed earlier</p> <p>Change option to guidance and may to should</p> <p>Add per federal manual – remove paragraph</p>
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<p><b>No Through Movement</b> Support: A lane that is shared by left-turn and right-turn movements is sometimes provided on an approach that has no through movement, such as the stem of a T-intersection or where the opposite approach is a one-way roadway in the opposing direction.</p> <p>Standard: When a shared left-turn/right-turn lane exists on a signalized approach, the left-turn and right-turn movements shall start and terminate simultaneously and the red signal indication used in each of the signal faces on the approach shall be a CIRCULAR RED.</p> <p>Support: This requirement for the use of CIRCULAR RED signal indications in signal faces for approaches having a shared lane for left-turn and right-turn movements is a specific exception to other provisions in this Chapter that would otherwise require the use of RED ARROW signal indications.</p> <p>Standard: The signal faces provided for an approach with a shared left-turn/right-turn lane and no through movement shall be one of the following: A. Two or more signal faces, each capable of displaying CIRCULAR RED, CIRCULAR YELLOW, and CIRCULAR GREEN signal indications, shall be provided for the approach. This display shall be permissible regardless of number of exclusive left-turn and/or right-turn lanes that exist on the approach in addition to the shared left-turn/right-turn lane and regardless of whether or not there are</p>	<p><b>No Through Movement</b> Support: 01 A lane that is shared by left-turn and right-turn movements is sometimes provided on an approach that has no through movement, such as the stem of a T-intersection or where the opposite approach is a one-way roadway in the opposing direction.</p> <p><b>Standard:</b> 02 <b>When a shared left-turn/right-turn lane exists on a signalized approach, the left-turn and right-turn movements shall start and terminate simultaneously and the red signal indication used in each of the signal faces on the approach shall be a CIRCULAR RED.</b></p> <p>Support: 03 This requirement for the use of CIRCULAR RED signal indications in signal faces for approaches having a shared lane for left-turn and right-turn movements is a specific exception to other provisions in this Chapter that would otherwise require the use of RED ARROW signal indications.</p> <p><b>Standard:</b> 04 <b>The signal faces provided for an approach with a shared left-turn/right-turn lane and no through movement shall be one of the following:</b> <b>A. Two or more signal faces, each capable of displaying CIRCULAR RED, CIRCULAR YELLOW, and CIRCULAR GREEN signal indications, shall be provided for the approach. This display shall be permissible regardless of number of exclusive left-turn and/or right-turn lanes that exist on the approach in addition to the shared left-turn/right-turn lane and regardless of whether or not there are pedestrian or opposing vehicular movements that conflict</b></p>	<p>A lane that is shared by left-turn and right-turn movements is sometimes provided on an approach that has no through movement, such as the stem of a T-intersection or where the opposite approach is a one-way roadway in the opposing direction.</p> <p>Standard: When a shared left-turn/right-turn lane exists on a signalized approach, the left-turn and right-turn movements shall start and terminate simultaneously and the red signal indication used in each of the signal faces on the approach shall be a CIRCULAR RED.</p> <p>Support: This requirement for the use of CIRCULAR RED signal indications in signal faces for approaches having a shared lane for left-turn and right-turn movements is a specific exception to other provisions in this Chapter that would otherwise require the use of RED ARROW signal indications.</p> <p>Standard: The signal faces provided for an approach with a shared left-turn/right-turn lane and no through movement shall be one of the following: A. Two or more signal faces, each capable of displaying CIRCULAR RED, CIRCULAR YELLOW, and CIRCULAR GREEN signal indications, shall be provided for the approach. This display shall be permissible regardless of number of exclusive left-turn and/or right-turn lanes that exist on the approach in addition to the shared left-turn/right-turn lane and regardless of whether or not there are pedestrian or opposing vehicular movements that conflict with the left-turn or right-turn</p>	<p>language</p>
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<p>pedestrian or opposing vehicular movements that conflict with the left-turn or right-turn movements. However, if there is an opposing approach and the signal phasing protects the left-turn movement on the approach with the shared left-turn/right-turn lane from conflicts with the opposing vehicular movements and any signalized pedestrian movements, a left-turn GREEN ARROW signal indication shall also be included in the left-most signal face and shall be displayed simultaneously with the CIRCULAR GREEN signal indication.</p> <p>B. If the approach has one or more exclusive turn lanes in addition to the shared left-turn/right-turn lane and there is no conflict with a signalized vehicular or pedestrian movement, and GREEN ARROW signal indications are used in place of CIRCULAR GREEN signal indications on the approach, the signal faces for the approach shall be:</p> <ol style="list-style-type: none"> <li>1. A signal face(s) capable of displaying CIRCULAR RED, YELLOW ARROW, and GREEN ARROW signal indications for the exclusive turn lane(s), with the arrows pointing in the direction of the turn, and</li> <li>2. A shared left-turn/right-turn signal face capable of displaying CIRCULAR RED, left-turn YELLOW ARROW, left-turn GREEN ARROW, right-turn YELLOW ARROW, and right-turn GREEN ARROW signal indications, in an arrangement of signal sections that complies with the provisions of Section 4D.09 or 4D.10.</li> </ol> <p>C. If the approach has one or more exclusive turn lanes in addition to the shared left-turn/right-turn lane and there is a conflict with a signalized vehicular or pedestrian movement, and flashing YELLOW ARROW signal indications are used in place of CIRCULAR GREEN signal indications on the approach, the</p>	<p><b>with the left-turn or rightturn movements. However, if there is an opposing approach and the signal phasing protects the left-turn movement on the approach with the shared left-turn/right-turn lane from conflicts with the opposing vehicular movements and any signalized pedestrian movements, a left-turn GREEN ARROW signal indication shall also be included in the left-most signal face and shall be displayed simultaneously with the CIRCULAR GREEN signal indication.</b></p> <p><b>B. If the approach has one or more exclusive turn lanes in addition to the shared left-turn/right-turn lane and there is no conflict with a signalized vehicular or pedestrian movement, and GREEN ARROW signal indications are used in place of CIRCULAR GREEN signal indications on the approach, the signal faces for the approach shall be:</b></p> <ol style="list-style-type: none"> <li><b>1. A signal face(s) capable of displaying CIRCULAR RED, YELLOW ARROW, and GREEN ARROW signal indications for the exclusive turn lane(s), with the arrows pointing in the direction of the turn, and</b></li> <li><b>2. A shared left-turn/right-turn signal face capable of displaying CIRCULAR RED, left-turn YELLOW ARROW, left-turn GREEN ARROW, right-turn YELLOW ARROW, and right-turn GREEN ARROW signal indications, in an arrangement of signal sections that complies with the provisions of Section 4D.09 or 4D.10.</b></li> </ol> <p><b>C. If the approach has one or more exclusive turn lanes in addition to the shared left-turn/rightturn lane and there is a conflict with a signalized vehicular or pedestrian movement, and flashing YELLOW ARROW signal indications are used in place of CIRCULAR GREEN signal indications on the approach, the signal faces for the</b></p>	<p>movements. However, if there is an opposing approach and the signal phasing protects the left-turn movement on the approach with the shared left-turn/right-turn lane from conflicts with the opposing vehicular movements and any signalized pedestrian movements, a left-turn GREEN ARROW signal indication shall also be included in the left-most signal face and shall be displayed simultaneously with the CIRCULAR GREEN signal indication.</p> <p>B. If the approach has one or more exclusive turn lanes in addition to the shared left-turn/right-turn lane and there is no conflict with a signalized vehicular or pedestrian movement, and GREEN ARROW signal indications are used in place of CIRCULAR GREEN signal indications on the approach, the signal faces for the approach shall be:</p> <ol style="list-style-type: none"> <li>1. A signal face(s) capable of displaying CIRCULAR RED, YELLOW ARROW, and GREEN ARROW signal indications for the exclusive turn lane(s), with the arrows pointing in the direction of the turn, and</li> <li>2. A shared left-turn/right-turn signal face capable of displaying CIRCULAR RED, left-turn YELLOW ARROW, left-turn GREEN ARROW, right-turn YELLOW ARROW, and right-turn GREEN ARROW signal indications, in an arrangement of signal sections that complies with the provisions of Section 4D.09 or 4D.10.</li> </ol> <p>C. If the approach has one or more exclusive turn lanes in addition to the shared left-turn/right-turn lane and there is a conflict with a signalized vehicular or pedestrian movement, and flashing YELLOW ARROW signal indications are used in place of CIRCULAR GREEN signal indications on the approach, the signal faces for the approach shall be as described in Items B.1 and B.2, except that</p>	
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<p>signal faces for the approach shall be as described in Items B.1 and B.2, except that flashing YELLOW ARROW signal indications shall be used in place of the GREEN ARROW signal indications for the turning movement(s) that conflicts with the signalized vehicular or pedestrian movement.</p> <p>Support: Figure 4D-20 illustrates application of these Standards on approaches that have only a shared left-turn/right-turn lane, and on approaches that have one or more exclusive turn lanes in addition to the shared left-turn/right-turn lane.</p> <p>Option: If the lane-use regulations on an approach are variable such that at certain times all of the lanes on the approach are designated as exclusive turn lanes and no lane is designated as a shared left-turn/right-turn lane: A. During the times that no lane is designated as a shared left-turn/right-turn lane, the left-turn and right-turn movements may start and terminate independently, and the left-turn and right-turn movements may be operated in one or more of the modes of operation as described in Sections 4D.17 through 4D.24; and B. If a protected-permissive mode is used, the shared left-turn/right-turn signal face provided in Paragraph 4 above may be modified to include a dual-arrow signal section capable of displaying both a GREEN ARROW signal indication and a flashing YELLOW ARROW signal indication for a turn movement(s) in order to not exceed the maximum of five sections per signal face provided in Section 4D.08.</p>	<p><b>approach shall be as described in Items B.1 and B.2, except that flashing YELLOW ARROW signal indications shall be used in place of the GREEN ARROW signal indications for the turning movement(s) that conflicts with the signalized vehicular or pedestrian movement.</b></p> <p>Support: 05 Figure 4D-20 illustrates application of these Standards on approaches that have only a shared left-turn/right-turn lane, and on approaches that have one or more exclusive turn lanes in addition to the shared left-turn/right-turn lane.</p> <p>Option: 06 If the lane-use regulations on an approach are variable such that at certain times all of the lanes on the approach are designated as exclusive turn lanes and no lane is designated as a shared left-turn/right-turn lane: A. During the times that no lane is designated as a shared left-turn/right-turn lane, the left-turn and right-turn movements may start and terminate independently, and the left-turn and right-turn movements may be operated in one or more of the modes of operation as described in Sections 4D.17 through 4D.24; and B. If a protected-permissive mode is used, the shared left-turn/right-turn signal face provided in Paragraph 4 may be modified to include a dual-arrow signal section capable of displaying both a GREEN ARROW signal indication and a flashing YELLOW ARROW signal indication for a turn movement(s) in order to not exceed the maximum of five sections per signal face provided in Section 4D.08.</p>	<p>flashing YELLOW ARROW signal indications shall be used in place of the GREEN ARROW signal indications for the turning movement(s) that conflicts with the signalized vehicular or pedestrian movement.</p> <p>Support: Figure 4D-20 illustrates application of these Standards on approaches that have only a shared left-turn/right-turn lane, and on approaches that have one or more exclusive turn lanes in addition to the shared left-turn/right-turn lane.</p> <p>Option: If the lane-use regulations on an approach are variable such that at certain times all of the lanes on the approach are designated as exclusive turn lanes and no lane is designated as a shared left-turn/right-turn lane: A. During the times that no lane is designated as a shared left-turn/right-turn lane, the left-turn and right-turn movements may start and terminate independently, and the left-turn and right-turn movements may be operated in one or more of the modes of operation as described in Sections 4D.17 through 4D.24; and B. If a protected-permissive mode is used, the shared left-turn/right-turn signal face provided above may be modified to include a dual-arrow signal section capable of displaying both a GREEN ARROW signal indication and a flashing YELLOW ARROW signal indication for a turn movement(s) in order to not exceed the maximum of five sections per signal face provided in Section 4D.08.</p>	
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<p><del>4D.10</del> 4D.26 Yellow Change and Red Clearance Intervals</p> <p>STANDARD A steady yellow signal indication shall be displayed following every CIRCULAR GREEN or GREEN ARROW signal indication and following every flashing YELLOW ARROW or flashing RED ARROW signal indication displayed as a part of a steady mode operation. This requirement shall not apply when a CIRCULAR GREEN, a flashing YELLOW ARROW, or a flashing RED ARROW signal indication is followed immediately by a GREEN ARROW signal indication.</p> <p>The exclusive function of the yellow change interval shall be to warn traffic of an impending change in the right-of-way assignment.</p> <p>The duration of a the yellow change interval shall be predetermined using engineering practices.</p> <p>Support: Section 4D.05 contains provisions regarding the display of steady CIRCULAR YELLOW signal indications to approaches from which drivers are allowed to make permissive left turns.</p> <p><del>OPTION</del> GUIDANCE When indicated by the application of engineering practices, the The yellow change interval may should be followed by a red clearance interval to provide additional time</p>	<p><b>Section 4D.26 Yellow Change and Red Clearance Intervals</b></p> <p><b>Standard:</b> 01 A steady yellow signal indication shall be displayed following every CIRCULAR GREEN or GREEN ARROW signal indication and following every flashing YELLOW ARROW or flashing RED ARROW signal indication displayed as a part of a steady mode operation. This requirement shall not apply when a CIRCULAR GREEN, a flashing YELLOW ARROW, or a flashing RED ARROW signal indication is followed immediately by a GREEN ARROW signal indication. 02 The exclusive function of the yellow change interval shall be to warn traffic of an impending change in the right-of-way assignment. 03 The duration of the yellow change interval shall be determined using engineering practices.</p> <p>Support: 04 Section 4D.05 contains provisions regarding the display of steady CIRCULAR YELLOW signal indications to approaches from which drivers are allowed to make permissive left turns.</p> <p>Guidance: 05 When indicated by the application of engineering practices, the yellow change interval should be followed by a red clearance interval to provide additional time before conflicting traffic movements, including pedestrians, are released.</p>	<p>4D.26 Yellow Change and Red Clearance Intervals</p> <p>STANDARD A steady yellow signal indication shall be displayed following every CIRCULAR GREEN or GREEN ARROW signal indication and following every flashing YELLOW ARROW or flashing RED ARROW signal indication displayed as a part of a steady mode operation. This requirement shall not apply when a CIRCULAR GREEN, a flashing YELLOW ARROW, or a flashing RED ARROW signal indication is followed immediately by a GREEN ARROW signal indication.</p> <p>The exclusive function of the yellow change interval shall be to warn traffic of an impending change in the right-of-way assignment.</p> <p>The duration of the yellow change interval shall be determined using engineering practices.</p> <p>Support: Section 4D.05 contains provisions regarding the display of steady CIRCULAR YELLOW signal indications to approaches from which drivers are allowed to make permissive left turns.</p> <p>GUIDANCE When indicated by the application of engineering practices, the yellow change interval should be followed by a red clearance interval to provide additional time before conflicting traffic movements, including pedestrians, are released.</p> <p>STANDARD</p>	<p>End 3-23-11 MCUTCD mtg Begin 4-13-11 MCUTCD mtg Relocated from 4D.10</p> <p>Recommend changing per fed manual</p>
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<p>before conflicting traffic movements, including pedestrians, are released.</p> <p><b>STANDARD</b></p> <p>When used, The duration of a the red clearance interval shall be predetermined using engineering practices.</p> <p><b>Support:</b> Engineering practices for determining the duration of yellow change and red clearance intervals can be found in ITE’s “Traffic Control Devices Handbook” and in ITE’s “Manual of Traffic Signal Design” (see Section 1A.11).</p> <p><b>Standard:</b></p> <p>The durations of yellow change intervals and red clearance intervals shall be consistent with the determined values within the technical capabilities of the controller unit.</p> <p>The duration of a yellow change interval shall not vary on a cycle-by-cycle basis within the same signal timing plan.</p> <p>Except as provided in Paragraph 12 below, the duration of a red clearance interval shall not be decreased or omitted on a cycle-by-cycle basis within the same signal timing plan.</p> <p><b>Option:</b> The duration of a red clearance interval may be extended from its predetermined value for a given cycle based upon the detection of a vehicle that is predicted to violate the red signal indication.</p> <p>When an actuated signal sequence includes a signal phase for permissive/protected (lagging)</p>	<p><b>Standard:</b></p> <p>06 <b>When used, the duration of the red clearance interval shall be determined using engineering practices.</b></p> <p><b>Support:</b> 07 Engineering practices for determining the duration of yellow change and red clearance intervals can be found in ITE’s “Traffic Control Devices Handbook” and in ITE’s “Manual of Traffic Signal Design” (see Section 1A.11).</p> <p><b>Standard:</b></p> <p>08 <b>The durations of yellow change intervals and red clearance intervals shall be consistent with the determined values within the technical capabilities of the controller unit.</b></p> <p>09 <b>The duration of a yellow change interval shall not vary on a cycle-by-cycle basis within the same signal timing plan.</b></p> <p>10 <b>Except as provided in Paragraph 12, the duration of a red clearance interval shall not be decreased or omitted on a cycle-by-cycle basis within the same signal timing plan.</b></p> <p><b>Option:</b></p> <p>11 The duration of a red clearance interval may be extended from its predetermined value for a given cycle based upon the detection of a vehicle that is predicted to violate the red signal indication.</p> <p>12 When an actuated signal sequence includes a signal phase for permissive/protected (lagging) left-turn movements in both directions, the red clearance interval may be shown during those cycles when the lagging left-turn signal phase</p>	<p>When used, The duration of the red clearance interval shall be determined using engineering practices.</p> <p><b>Support:</b> Engineering practices for determining the duration of yellow change and red clearance intervals can be found in ITE’s “Traffic Control Devices Handbook” and in ITE’s “Manual of Traffic Signal Design” (see Section 1A.11).</p> <p><b>Standard:</b></p> <p>The durations of yellow change intervals and red clearance intervals shall be consistent with the determined values within the technical capabilities of the controller unit.</p> <p>The duration of a yellow change interval shall not vary on a cycle-by-cycle basis within the same signal timing plan.</p> <p>Except as provided below, the duration of a red clearance interval shall not be decreased or omitted on a cycle-by-cycle basis within the same signal timing plan.</p> <p><b>Option:</b> The duration of a red clearance interval may be extended from its predetermined value for a given cycle based upon the detection of a vehicle that is predicted to violate the red signal indication.</p> <p>When an actuated signal sequence includes a signal phase for permissive/protected (lagging) left-turn movements in both directions, the red clearance interval may be shown during those cycles when the lagging left-turn signal phase is skipped and may be omitted during those</p>	<p>Remove paragraph language</p>
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<p>left-turn movements in both directions, the red clearance interval may be shown during those cycles when the lagging left-turn signal phase is skipped and may be omitted during those cycles when the lagging left-turn signal phase is shown.</p> <p>The duration of a yellow change interval or a red clearance interval may be different in different signal timing plans for the same controller unit.</p> <p><b>GUIDANCE</b> A yellow change interval should have a minimum duration of approximately 3 to seconds and a maximum duration of 6 seconds. The longer intervals should be reserved for use on approaches with higher speeds.</p> <p>Except when clearing a one-lane, two-way facility (see Section 4H.02) or when clearing an exceptionally wide intersection, a red clearance interval should have a duration not exceeding 6 seconds.</p> <p><b>Standard:</b> Except for warning beacons mounted on advance warning signs on the approach to a signalized location (see Section 2C.36), signal displays that are intended to provide a “pre-yellow warning” interval, such as flashing green signal indications, vehicular countdown displays, or other similar displays, shall not be used at a signalized location.</p> <p><b>Support:</b> The use of signal displays (other than warning beacons mounted on advance warning signs) that convey a “pre-yellow warning” have been found by research to increase the frequency of</p>	<p>is skipped and may be omitted during those cycles when the lagging left-turn signal phase is shown.</p> <p>13 The duration of a yellow change interval or a red clearance interval may be different in different signal timing plans for the same controller unit.</p> <p><i>Guidance:</i> 14 A yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds. The longer intervals should be reserved for use on approaches with higher speeds. 15 Except when clearing a one-lane, two-way facility (see Section 4H.02) or when clearing an exceptionally wide intersection, a red clearance interval should have a duration not exceeding 6 seconds.</p> <p><b>Standard:</b> 16 <b>Except for warning beacons mounted on advance warning signs on the approach to a signalized location (see Section 2C.36), signal displays that are intended to provide a “pre-yellow warning” interval, such as flashing green signal indications, vehicular countdown displays, or other similar displays, shall not be used at a signalized location.</b></p> <p><b>Support:</b> 17 The use of signal displays (other than warning beacons mounted on advance warning signs) that convey a “pre-yellow warning” have been found by research to increase the</p>	<p>cycles when the lagging left-turn signal phase is shown.</p> <p>The duration of a yellow change interval or a red clearance interval may be different in different signal timing plans for the same controller unit.</p> <p><b>GUIDANCE</b> A yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds. The longer intervals should be reserved for use on approaches with higher speeds.</p> <p>Except when clearing a one-lane, two-way facility (see Section 4H.02) or when clearing an exceptionally wide intersection, a red clearance interval should have a duration not exceeding 6 seconds.</p> <p><b>Standard:</b> Except for warning beacons mounted on advance warning signs on the approach to a signalized location (see Section 2C.36), signal displays that are intended to provide a “pre-yellow warning” interval, such as flashing green signal indications, vehicular countdown displays, or other similar displays, <b>shall not be used at a signalized location.</b></p> <p><b>Support:</b> The use of signal displays (other than warning beacons mounted on advance warning signs) that convey a “pre-yellow warning” have been found by research to increase the frequency of crashes.</p>	
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<p>crashes.</p> <p><del>4D.13</del> 4D.27 Preemption and Priority Control of Traffic Control Signals</p> <p>OPTION Traffic control signals may be designed and operated to respond to certain classes of approaching vehicles by altering the normal signal timing and phasing plan(s) during the approach and passage of those vehicles. The alternative plan(s) may be as simple as extending a currently displayed green interval or as complex as replacing the entire set of signal phases and timing.</p> <p>Preemption or priority control of traffic control signals may also be a means of assigning priority right-of-way to specified classes of vehicles at certain non-intersection locations such as on approaches to one-lane bridges and tunnels, movable bridges, highway maintenance and construction activities, metered freeway entrance ramps, and transit operations.</p> <p>SUPPORT <b>Refer to applicable state statutes and local ordinances that may define which vehicles are authorized to preempt traffic signals or to request priority at traffic signals.</b> Preemption control (see definition in Section <del>4A.2</del>1A.13) is typically given to trains, boats, and emergency vehicles, and light rail transit. Examples of preemption control include the</p>	<p>frequency of crashes.</p> <p><b>Section 4D.27 Preemption and Priority Control of Traffic Control Signals</b></p> <p>Option: 01 Traffic control signals may be designed and operated to respond to certain classes of approaching vehicles by altering the normal signal timing and phasing plan(s) during the approach and passage of those vehicles. The alternative plan(s) may be as simple as extending a currently displayed green interval or as complex as replacing the entire set of signal phases and timing.</p> <p>Support: 02 Preemption control (see definition in Section 1A.13) is typically given to trains, boats, emergency vehicles, and light rail transit. 03 Examples of preemption control include the</p>	<p>4D.27 Preemption and Priority Control of Traffic Control Signals</p> <p>OPTION Traffic control signals may be designed and operated to respond to certain classes of approaching vehicles by altering the normal signal timing and phasing plan(s) during the approach and passage of those vehicles. The alternative plan(s) may be as simple as extending a currently displayed green interval or as complex as replacing the entire set of signal phases and timing.</p> <p>Preemption or priority control of traffic control signals may also be a means of assigning priority right-of-way to specified classes of vehicles at certain non-intersection locations such as on approaches to one-lane bridges and tunnels, movable bridges, highway maintenance and construction activities, metered freeway entrance ramps, and transit operations.</p> <p>SUPPORT <b>Refer to applicable state statutes and local ordinances that may define which vehicles are authorized to preempt traffic signals or to request priority at traffic signals.</b> Preemption control (see definition in Section 1A.13) is typically given to trains, boats, and emergency vehicles, and light rail transit. Examples of preemption control include the following:</p>	<p>Recommend leaving Mn language as is other than where indicated.</p> <p>Recommend updating with changes in federal manual language</p>
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<p>following:</p> <p>A. The prompt displaying of green signal indications at signalized locations ahead of fire vehicles, law enforcement vehicles, ambulances, and other official emergency vehicles;</p> <p>B. A special sequence of signal phases and timing to expedite and/or provide additional clearance time for vehicles to clear the tracks prior to the arrival of <del>a train</del> rail traffic; and</p> <p>C. A special sequence of signal phases to display a steady red indication to prohibit turning movements towards the tracks during the approach or passage of rail traffic <del>a train</del>.</p> <p>Priority control (see definition in Section <del>4A.2</del> 1A.13) is typically given to certain nonemergency vehicles such as <del>buses and</del> light-rail transit vehicles operating in a mixed-use alignment and buses.</p> <p>Examples of priority control include the following:</p> <p>A. The displaying of early or extended green signal indications at an intersection to assist public transit vehicles in remaining on schedule; and</p> <p>B. Special phasing to assist public transit vehicles in entering the travel stream ahead of the platoon of traffic.</p> <p>Some types or classes of vehicles supersede others when a traffic control signal responds to more than one type or class. In general, a vehicle that is more difficult to control supersedes a vehicle that is easier to control.</p> <p><b>STANDARD</b>  <b>Strobe actuated preemption and priority detection systems shall respond to emitted frequencies:</b></p>	<p>following:</p> <p>A. The prompt displaying of green signal indications at signalized locations ahead of fire vehicles, law enforcement vehicles, ambulances, and other official emergency vehicles;</p> <p>B. A special sequence of signal phases and timing to expedite and/or provide additional clearance time for vehicles to clear the tracks prior to the arrival of rail traffic; and</p> <p>C. A special sequence of signal phases to display a steady red indication to prohibit turning movements toward the tracks during the approach or passage of rail traffic.</p> <p>04 Priority control (see definition in Section 1A.13) is typically given to certain non-emergency vehicles such as light-rail transit vehicles operating in a mixed-use alignment and buses.</p> <p>05 Examples of priority control include the following:</p> <p>A. The displaying of early or extended green signal indications at an intersection to assist public transit vehicles in remaining on schedule, and</p> <p>B. Special phasing to assist public transit vehicles in entering the travel stream ahead of the platoon of traffic.</p> <p>06 Some types or classes of vehicles supersede others when a traffic control signal responds to more than one type or class. In general, a vehicle that is more difficult to control supersedes a vehicle that is easier to control.</p> <p>Option:</p> <p>07 Preemption or priority control of traffic control signals may also be a means of</p>	<p>A. The prompt displaying of green signal indications at signalized locations ahead of fire vehicles, law enforcement vehicles, ambulances, and other official emergency vehicles;</p> <p>B. A special sequence of signal phases and timing to expedite and/or provide additional clearance time for vehicles to clear the tracks prior to the arrival of rail traffic; and</p> <p>C. A special sequence of signal phases to display a steady red indication to prohibit turning movements towards the tracks during the approach or passage of rail traffic</p> <p>Priority control (see definition in Section 1A.13) is typically given to certain nonemergency vehicles such as light-rail transit vehicles operating in a mixed-use alignment and buses.</p> <p>Examples of priority control include the following:</p> <p>A. The displaying of early or extended green signal indications at an intersection to assist public transit vehicles in remaining on schedule; and</p> <p>B. Special phasing to assist public transit vehicles in entering the travel stream ahead of the platoon of traffic.</p> <p>Some types or classes of vehicles supersede others when a traffic control signal responds to more than one type or class. In general, a vehicle that is more difficult to control supersedes a vehicle that is easier to control.</p> <p><b>STANDARD</b>  <b>Strobe actuated preemption and priority detection systems shall respond to emitted frequencies:</b></p>	<p>Light rail transit is listed in fed manual it was not in Mn manual</p> <p>Language moved above per 2005 MNMUTCD</p>
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**Preemption - 14.035 Hz ± 0.05 Hz**  
**Priority - 9.639 Hz ± 0.03 Hz**

**Railroad preemption shall have priority over all other types of preemption and priority, including authorized emergency vehicles.**

**GUIDANCE**

Traffic control signals operating under preemption control or under priority control should be operated in a manner designed to keep traffic moving.

Traffic control signals that are designed to respond under preemption or priority control to more than one type or class of vehicle should be designed to respond in the relative order of importance or difficulty in stopping the type or class of vehicle. **The order of priority should be:**

- 1. High priority preemption, including trains and semiexclusive alignment light rail crossings where the light rail transit movement is not controlled by a traffic control signal or a light rail transit signal.**
- 2. Emergency vehicle preemption.**
- 3. Transit priority, including buses and semiexclusive or mixed-use alignment light rail crossings where the light rail transit movement is controlled by a traffic control signal or a light rail transit signal.**

*If engineering judgment indicates that light rail transit signal indications would reduce road user confusion that might otherwise occur if standard traffic signal indications were used to control these movements, light rail transit signal indications complying with Section 8C.11 and as illustrated in Figure 8C-3 may be*

assigning priority right-of-way to specified classes of vehicles at certain non-intersection locations such as on approaches to one-lane bridges and tunnels, movable bridges, highway maintenance and construction activities, metered freeway entrance ramps, and transit operations.

**Standard:**

**08 During the transition into preemption control:**

**A. The yellow change interval, and any red clearance interval that follows, shall not be shortened or omitted.**

**B. The shortening or omission of any pedestrian walk interval and/or pedestrian change interval shall be permitted.**

**C. The return to the previous green signal indication shall be permitted following a steady yellow signal indication in the same signal face, omitting the red clearance interval, if any.**

**09 During preemption control and during the transition out of preemption control:**

**A. The shortening or omission of any yellow change interval, and of any red clearance interval that follows, shall not be permitted.**

**B. A signal indication sequence from a steady yellow signal indication to a green signal indication shall not be permitted.**

**10 During priority control and during the transition into or out of priority control:**

**A. The shortening or omission of any yellow change interval, and of any red clearance interval that follows, shall not be permitted.**

**B. The shortening of any pedestrian walk interval below that time described in Section 4E.06 shall not be permitted.**

**C. The omission of a pedestrian walk interval and its associated change interval shall not be permitted unless the associated**

**Preemption - 14.035 Hz ± 0.05 Hz**  
**Priority - 9.639 Hz ± 0.03 Hz**

**Railroad preemption shall have priority over all other types of preemption and priority, including authorized emergency vehicles.**

**GUIDANCE**

Traffic control signals operating under preemption control or under priority control should be operated in a manner designed to keep traffic moving.

Traffic control signals that are designed to respond under preemption or priority control to more than one type or class of vehicle should be designed to respond in the relative order of importance or difficulty in stopping the type or class of vehicle. **The order of priority should be:**

- 1. High priority preemption, including trains and semiexclusive alignment light rail crossings where the light rail transit movement is not controlled by a traffic control signal or a light rail transit signal.**
- 2. Emergency vehicle preemption.**
- 3. Transit priority, including buses and semiexclusive or mixed-use alignment light rail crossings where the light rail transit movement is controlled by a traffic control signal or a light rail transit signal.**

*If engineering judgment indicates that light rail transit signal indications would reduce road user confusion that might otherwise occur if standard traffic signal indications were used to control these movements, light rail transit signal indications complying with Section 8C.11 and as illustrated in Figure 8C-3 may be used for preemption or priority control of the*

<p>used for preemption or priority control of the following exclusive movements at signalized intersections:</p> <p>A. Public transit buses in “queue jumper” lanes, and</p> <p>B. Bus rapid transit in semi-exclusive or mixed-use alignments.</p> <p>Except for traffic control signals interconnected with light rail transit systems, traffic control signals with railroad preemption or coordinated with flashing-light signal systems should be provided with a back-up power supply</p> <p>When a traffic control signal that is returning to a steady mode from a dark mode (typically upon restoration from a power failure) receives a preemption or priority request, care should be exercised to minimize the possibility of vehicles or pedestrians being misdirected into conflict with the vehicle making the request.</p> <p><b>OPTION</b></p> <p>During the change from a dark mode to a steady mode under a preemption or priority request, the display of signal indications that could misdirect road users may be prevented by <b>one or more of</b> the following <b>methods</b>:</p> <p>A. Having the traffic control signal remain in the dark mode;</p> <p>B. Having the traffic control signal remain in the flashing mode;</p> <p>C. Altering the flashing mode;</p> <p>D. Executing the normal start-up routine before responding; and</p> <p>E. Responding directly to initial or dwell period.</p>	<p><b>vehicular phase is also omitted or the pedestrian phase is exclusive.</b></p> <p><b>D. The shortening or omission of any pedestrian change interval shall not be permitted.</b></p> <p><b>E. A signal indication sequence from a steady yellow signal indication to a green signal indication shall not be permitted.</b></p> <p><i>Guidance:</i></p> <p><sup>11</sup> <i>Except for traffic control signals interconnected with light rail transit systems, traffic control signals with railroad preemption or coordinated with flashing-light signal systems should be provided with a back-up power supply.</i></p> <p><sup>12</sup> <i>When a traffic control signal that is returning to a steady mode from a dark mode (typically upon restoration from a power failure) receives a preemption or priority request, care should be exercised to minimize the possibility of vehicles or pedestrians being misdirected into a conflict with the vehicle making the request.</i></p> <p><b>Option:</b></p> <p><sup>13</sup> During the change from a dark mode to a steady mode under a preemption or priority request, the display of signal indications that could misdirect road users may be prevented by one or more of the following methods:</p> <p>A. Having the traffic control signal remain in the dark mode,</p> <p>B. Having the traffic control signal remain in the flashing mode,</p> <p>C. Altering the flashing mode,</p> <p>D. Executing the normal start-up routine before responding, or</p> <p>E. Responding directly to initial or dwell period.</p>	<p>following exclusive movements at signalized intersections:</p> <p>A. Public transit buses in “queue jumper” lanes, and</p> <p>B. Bus rapid transit in semi-exclusive or mixed-use alignments.</p> <p>Except for traffic control signals interconnected with light rail transit systems, traffic control signals with railroad preemption or coordinated with flashing-light signal systems should be provided with a back-up power supply</p> <p>When a traffic control signal that is returning to a steady mode from a dark mode (typically upon restoration from a power failure) receives a preemption or priority request, care should be exercised to minimize the possibility of vehicles or pedestrians being misdirected into conflict with the vehicle making the request.</p> <p><b>OPTION</b></p> <p>During the change from a dark mode to a steady mode under a preemption or priority request, the display of signal indications that could misdirect road users may be prevented by one or more of the following methods:</p> <p>A. Having the traffic control signal remain in the dark mode;</p> <p>B. Having the traffic control signal remain in the flashing mode;</p> <p>C. Altering the flashing mode;</p> <p>D. Executing the normal start-up routine before responding; and</p> <p>E. Responding directly to initial or dwell period.</p>	
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<p>4D-<del>13</del> 27.1 Operation of Preemption</p> <p><b>STANDARD</b>  During the transition into preemption control:  A. The yellow change interval, and any red clearance interval that follows, shall not be shortened or omitted.  B. The shortening or omission of any pedestrian walk interval and/or pedestrian change interval shall be permitted. <del>(See Section 4E.7 regarding shortening of the pedestrian change interval with the use of Countdown Pedestrian Signals and Section 4E.6 regarding shortening of the pedestrian change interval with the use of Accessible Pedestrian Signals).</del>  C. The return to the previous <b>steady</b> green signal indication shall be permitted following a steady yellow signal indication in the same signal face, omitting the red clearance interval, if any.  During preemption control and during the transition out of preemption control:  A. The shortening or omission of any yellow change interval, and of any red clearance interval that follows, shall not be permitted.  B. A signal indication sequence from a steady yellow signal indication to a <b>steady</b> green signal indication shall not be permitted.</p> <p><b>GUIDANCE</b>  <b>If the pedestrian change interval is shortened during the transition into preemption control, it should not be shortened below the minimum pedestrian change interval time described in Section 4E.10.</b></p> <p><b>STANDARD</b>  All newly constructed signals shall be wired</p>	<p><i>Guidance:</i>  14 <i>If a traffic control signal is installed near or within a grade crossing or if a grade crossing with active traffic control devices is within or near a signalized highway intersection, Chapter 8C should be consulted.</i>  15 <i>Traffic control signals operating under preemption control or under priority control should be operated in a manner designed to keep traffic moving.</i>  16 <i>Traffic control signals that are designed to respond under preemption or priority control to more than one type or class of vehicle should be designed to respond in the relative order of importance or difficulty in stopping the type or class of vehicle. The order of priority should be: train, boat, heavy vehicle (fire vehicle, emergency medical service), light vehicle (law enforcement), light rail transit, rubber-tired transit.</i></p> <p>Option:  17 A distinctive indication may be provided at the intersection to show that an emergency vehicle has been given control of the traffic control signal (see Section 11-106 of the “Uniform Vehicle Code”). In order to assist in the understanding of the control of the traffic signal, a common distinctive indication may be used where drivers from different agencies travel through the same intersection when responding to emergencies.  18 If engineering judgment indicates that light rail transit signal indications would reduce road user confusion that might otherwise occur if standard traffic signal indications were used to control these movements, light rail transit signal indications complying with Section 8C.11 and as illustrated in Figure 8C-3 may be used for preemption or priority control of the following exclusive movements at signalized</p>	<p>4D- 27.1 Operation of Preemption</p> <p><b>STANDARD</b>  During the transition into preemption control:  A. The yellow change interval, and any red clearance interval that follows, shall not be shortened or omitted.  B. The shortening or omission of any pedestrian walk interval and/or pedestrian change interval shall be permitted  C. The return to the previous green signal indication shall be permitted following a steady yellow signal indication in the same signal face, omitting the red clearance interval, if any.  During preemption control and during the transition out of preemption control:  A. The shortening or omission of any yellow change interval, and of any red clearance interval that follows, shall not be permitted.  B. A signal indication sequence from a steady yellow signal indication to a green signal indication shall not be permitted.</p> <p><b>GUIDANCE</b>  <b>If the pedestrian change interval is shortened during the transition into preemption control, it should not be shortened below the minimum pedestrian change interval time described in Section</b></p>	<p>***committee suggest removing MN language and allowing permitting shortening in all cases that feds allow it – previously shortening not allowed in Mn manual with countdown signals, but these must now be installed everywhere it was also not allowed at signals with APS which are also now going in on a regular basis</p>
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<p><b>for Emergency Vehicle Preemption (EVP). This includes running the necessary electrical conductors to the base of each pole or terminating in the mast arm as appropriate.</b></p> <p><b>Traffic signals with EVP shall use confirmatory white/clear indicator lights. The confirmatory lights shall only be used during signal preemption.</b></p> <p><b>A. A steady confirmatory indicator light facing an approach shall mean that the authorized emergency vehicle preemption has been received by the signal controller for that approach.</b></p> <p><b>B. A flashing confirmatory indicator light facing an approach shall mean that the signal controller has received a conflicting preemption call and cannot respond to the preemption from the authorized emergency vehicle on the approach.</b></p> <p><b>SUPPORT</b></p> <p><b>The purpose of the confirmatory indicator light is to verify to the authorized emergency vehicle driver that the controller has received the preemption call, to indicate which approach will be served under the preemption, or to verify that a train has preempted the operation of the signal. The confirmatory indicator light does not assign any right of way at the intersection. The driver of the emergency vehicle is required to respond to the traffic control signal indications in accordance with applicable statutes and ordinances.</b></p> <p><b>GUIDANCE</b></p> <p><b>A time limit for which an emergency vehicle</b></p>	<p>intersections:</p> <p>A. Public transit buses in “queue jumper” lanes, and</p> <p>B. Bus rapid transit in semi-exclusive or mixed-use alignments.</p>	<p><b>4E.10.</b></p> <p><b>STANDARD</b></p> <p><b>All newly constructed signals shall be wired for Emergency Vehicle Preemption (EVP). This includes running the necessary electrical conductors to the base of each pole or terminating in the mast arm as appropriate.</b></p> <p><b>Traffic signals with EVP shall use confirmatory white/clear indicator lights. The confirmatory lights shall only be used during signal preemption.</b></p> <p><b>A. A steady confirmatory indicator light facing an approach shall mean that the authorized emergency vehicle preemption has been received by the signal controller for that approach.</b></p> <p><b>B. A flashing confirmatory indicator light facing an approach shall mean that the signal controller has received a conflicting preemption call and cannot respond to the preemption from the authorized emergency vehicle on the approach.</b></p> <p><b>SUPPORT</b></p> <p><b>The purpose of the confirmatory indicator light is to verify to the authorized emergency vehicle driver that the controller has received the preemption call, to indicate which approach will be served under the preemption, or to verify that a train has preempted the operation of the signal. The confirmatory indicator light does not assign any right of way at the intersection. The driver of the emergency vehicle is required to respond to the traffic control signal indications in accordance with applicable</b></p>	
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<p>can preempt the traffic control signal should be used if the control equipment provides this capability.</p> <p><b>SUPPORT</b>  This time limit can be set either in the controller or in the preemption equipment. This time limit is to prevent the inadvertent continuous activation of preemption by a stopped authorized emergency vehicle with the strobe left on.</p> <p><b>STANDARD</b>  When the EVP is active, the indicator light shall flash or be steady, and the signal indications shall be displayed as indicated under the following types of operation:</p> <p><b>1. Two Phase Operation</b>  The authorized emergency vehicle's approach shall receive a steady confirmatory light along with the opposing approach. The controller shall cycle through to bring up the circular green indications. The conflicting approaches shall receive flashing confirmatory lights and circular red indications. (See Figure 4D-1 a).</p> <p><b>2. Multi-phase Protected/Permissive Operation</b>  The authorized emergency vehicle's approach shall receive a steady confirmatory indication light along with the opposing approach. The controller shall cycle through to bring up the circular green signal indication. The left turn green arrow is not given on the preempted approach since a permissive green ball for the opposing flow would have to be terminated first. An opposing left turner, seeing the signal go to yellow, might mistakenly assume that the preempted approach was</p>		<p>statutes and ordinances.</p> <p><b>GUIDANCE</b>  A time limit for which an emergency vehicle can preempt the traffic control signal should be used if the control equipment provides this capability.</p> <p><b>SUPPORT</b>  This time limit can be set either in the controller or in the preemption equipment. This time limit is to prevent the inadvertent continuous activation of preemption by a stopped authorized emergency vehicle with the strobe left on.</p> <p><b>STANDARD</b>  When the EVP is active, the indicator light shall flash or be steady, and the signal indications shall be displayed as indicated under the following types of operation:</p> <p><b>1. Two Phase Operation</b>  The authorized emergency vehicle's approach shall receive a steady confirmatory light along with the opposing approach. The controller shall cycle through to bring up the circular green indications. The conflicting approaches shall receive flashing confirmatory lights and circular red indications. (See Figure 4D-1).</p> <p><b>2. Multi-phase Protected/Permissive Operation</b>  The authorized emergency vehicle's approach shall receive a steady confirmatory indication light along with the opposing approach. The controller shall cycle through to bring up the circular green signal indication. The left turn green arrow is not given on the preempted approach since a permissive green ball for the</p>	<p>Figures relate to MN manual only. Were labeled incorrectly previously</p>
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also yellow, and turn into the oncoming traffic proceeding on a green. This is referred to as a "left turn trap." To avoid this, the left turn green arrow is not given to any approach. The operation of this intersection, under preemption, is similar to that of a two-phase intersection. Conflicting approaches shall receive flashing confirmatory indication lights and circular red signal indications. (See Figure 4D-2 b).

### 3. Multi-phase Protected/Permissive Operation with Ramps and One-Way Streets

The authorized emergency vehicle's approach shall receive a steady confirmatory indicator light, a protected left turn green arrow, and a circular green. The opposing and conflicting approaches shall receive flashing confirmatory indicator lights and red indications. (See Figure 4D-3 c).

### 4. Multi-phase Protected Operation

The authorized emergency vehicle's approach shall receive a steady confirmatory indicator light, a protected left turn green arrow, and a circular green. The opposing and conflicting approaches shall receive flashing confirmatory indicator lights and red indications. (See Figure 4D-4 d).

### 5. Railroad Preemption Operation

When preempted by trains or light rail transit vehicles at a railroad intersection, all confirmatory indicator lights shall flash.

#### OPTION

On an approach to a multi phase protected/permissive intersection, the authorized emergency vehicle's approach may receive a steady confirmatory indicator

opposing flow would have to be terminated first. An opposing left turner, seeing the signal go to yellow, might mistakenly assume that the preempted approach was also yellow, and turn into the oncoming traffic proceeding on a green. This is referred to as a "left turn trap." To avoid this, the left turn green arrow is not given to any approach. The operation of this intersection, under preemption, is similar to that of a two-phase intersection. Conflicting approaches shall receive flashing confirmatory indication lights and circular red signal indications. (See Figure 4D-2).

### 3. Multi-phase Protected/Permissive Operation with Ramps and One-Way Streets

The authorized emergency vehicle's approach shall receive a steady confirmatory indicator light, a protected left turn green arrow, and a circular green. The opposing and conflicting approaches shall receive flashing confirmatory indicator lights and red indications. (See Figure 4D-3).

### 4. Multi-phase Protected Operation

The authorized emergency vehicle's approach shall receive a steady confirmatory indicator light, a protected left turn green arrow, and a circular green. The opposing and conflicting approaches shall receive flashing confirmatory indicator lights and red indications. (See Figure 4D-4).

### 5. Railroad Preemption Operation

When preempted by trains or light rail transit vehicles at a railroad intersection, all confirmatory indicator lights shall flash.

#### OPTION

On an approach to a multi phase protected/permissive intersection, the

<p><b>light, a protected left turn green arrow, and a circular green, with opposing and conflicting approaches receiving flashing confirmatory indicator lights and red indications, if the traffic signal first transitions to an all red indication for all approaches.</b></p> <p><b>On an approach to a multi phase protected operation intersection, if roadway geometry, signal operation, or preemption recognition distance is insufficient to clear left turning vehicles ahead of the authorized emergency vehicle, the authorized emergency vehicle's approach and the opposing approach may receive a steady confirmatory indicator light and a circular green and red left turn arrow, with all conflicting approaches receiving a flashing confirmatory indicator light and red indications. This alternative is permitted in low speed applications where clearing the left turn bay is a problem.</b></p> <p>GUIDANCE If a traffic control signal is installed near or within a <del>highway-railroad</del> grade crossing or if a <del>highway-railroad</del> grade crossing with active traffic control devices is within or near a signalized highway intersection, Chapter <del>8D</del> <b>8D</b> should be consulted.</p> <p>4D.<del>13</del><b>27.2</b> Operation of Priority STANDARD During priority control and during the transition into or out of priority control: A. The shortening or omission of any yellow change interval, and of any red clearance interval that follows, shall not be permitted. B. The shortening of any pedestrian walk interval below that time described in Section</p>		<p><b>authorized emergency vehicle's approach may receive a steady confirmatory indicator light, a protected left turn green arrow, and a circular green, with opposing and conflicting approaches receiving flashing confirmatory indicator lights and red indications, if the traffic signal first transitions to an all red indication for all approaches.</b></p> <p><b>On an approach to a multi phase protected operation intersection, if roadway geometry, signal operation, or preemption recognition distance is insufficient to clear left turning vehicles ahead of the authorized emergency vehicle, the authorized emergency vehicle's approach and the opposing approach may receive a steady confirmatory indicator light and a circular green and red left turn arrow, with all conflicting approaches receiving a flashing confirmatory indicator light and red indications. This alternative is permitted in low speed applications where clearing the left turn bay is a problem.</b></p> <p>GUIDANCE If a traffic control signal is installed near or within a grade crossing or if a grade crossing with active traffic control devices is within or near a signalized highway intersection, Chapter 8D should be consulted.</p> <p>4D.27.2 Operation of Priority STANDARD During priority control and during the transition into or out of priority control: A. The shortening or omission of any yellow change interval, and of any red clearance interval that follows, shall not be permitted. B. The shortening of any pedestrian walk</p>	<p>Parts relocated from 4D.11 and</p>
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<p>4E.<del>10</del>06 shall not be permitted.</p> <p>C. The omission of a pedestrian walk interval and its associated change interval shall not be permitted unless the associated vehicular phase is also omitted or the pedestrian phase is exclusive.</p> <p>D. The shortening or omission of any pedestrian change interval shall not be permitted.</p> <p>E. A signal indication sequence from a steady yellow signal indication to a <del>steady</del> green signal indication shall not be permitted.</p> <p><b>Confirmatory indicator lights shall not be displayed for priority operation. If confirmatory indicator lights exist at an intersection for preemption confirmation, a priority request shall not alter the preemption operation of the confirmatory indicator lights.</b></p> <p><b>Section 4D.28 Flashing Operation of Traffic Control Signals – General</b></p> <p>STANDARD</p> <p>The light source of a flashing signal indication shall be flashed continuously at a rate of not less than 50 nor more than 60 times per minute. The <del>illuminated</del> <del>displayed</del> period of each flash shall be <del>not less than half</del> a minimum of 1/2 and <del>not more than two-thirds</del> a maximum of 2/3 of the total flash cycle.</p> <p>Flashing signal indications shall comply with the requirements of other Sections of this Manual regarding <del>shielding</del> visibility-limiting or positioning of conflicting signal indications, except that flashing yellow signal indications</p>	<p><b>Section 4D.28 Flashing Operation of Traffic Control Signals – General</b></p> <p><b>Standard:</b></p> <p>01 <b>The light source of a flashing signal indication shall be flashed continuously at a rate of not less than 50 or more than 60 times per minute.</b></p> <p>02 <b>The displayed period of each flash shall be a minimum of 1/2 and a maximum of 2/3 of the total flash cycle.</b></p> <p>03 <b>Flashing signal indications shall comply with the requirements of other Sections of this Manual regarding visibility-limiting or positioning of conflicting signal indications, except that flashing yellow signal indications for through traffic shall not be</b></p>	<p>interval below that time described in Section 4E.06 shall not be permitted.</p> <p>C. The omission of a pedestrian walk interval and its associated change interval shall not be permitted unless the associated vehicular phase is also omitted or the pedestrian phase is exclusive.</p> <p>D. The shortening or omission of any pedestrian change interval shall not be permitted.</p> <p>E. A signal indication sequence from a steady yellow signal indication to a green signal indication shall not be permitted.</p> <p><b>Confirmatory indicator lights shall not be displayed for priority operation. If confirmatory indicator lights exist at an intersection for preemption confirmation, a priority request shall not alter the preemption operation of the confirmatory indicator lights.</b></p> <p><b>Section 4D.28 Flashing Operation of Traffic Control Signals – General</b></p> <p>STANDARD</p> <p>The light source of a flashing signal indication shall be flashed continuously at a rate of not less than 50 nor more than 60 times per minute. The displayed period of each flash shall a minimum of 1/2 and a maximum of 2/3 of the total flash cycle.</p> <p>Flashing signal indications shall comply with the requirements of other Sections of this Manual regarding visibility-limiting or positioning of conflicting signal indications, except that flashing yellow signal indications for through traffic shall not be required to be visibility-limited or positioned to minimize</p>	<p>4D.12</p> <p>Recommend changing per federal manual</p>
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<p>for through traffic shall not be required to be <del>shielded</del> <b>visibility-limited</b> or positioned to <del>prevent</del> <b>minimize</b> visual conflict for road users in separately controlled turn lanes. Each traffic control signal shall be provided with an independent flasher mechanism that operates in compliance with <b>this</b> Section <del>4D.11</del>.</p> <p>The flashing operation shall not be terminated by removal or turn-off of the controller unit or of the conflict monitor (malfunction management unit) or both. A manual switch, a conflict monitor (malfunction management unit) circuit, and, if appropriate, automatic means shall be provided to initiate the flashing mode.</p> <p><b>Option:</b> Based on engineering study or engineering judgment, traffic control signals may be operated in the flashing mode on a scheduled basis during one or more periods of the day rather than operated continuously in the steady (stop-and-go) mode.</p> <p><b>SUPPORT</b> Sections 4E.6 and 4E.9 contains information regarding the operation of <b>pedestrian signal heads and</b> accessible pedestrian signal detector pushbutton locator tones, <b>respectively</b>, during flashing operation.</p> <p><b>Section 4D.29 Flashing Operation – Transition Into Flashing Mode</b> Standard: The transition from steady (stop-and-go) mode to flashing mode, if initiated by a conflict monitor (malfunction management unit) or by a manual switch, shall be permitted to be made at any time. Programmed changes from steady</p>	<p><b>required to be visibility-limited or positioned to minimize visual conflict for road users in separately controlled turn lanes.</b></p> <p>04 <b>Each traffic control signal shall be provided with an independent flasher mechanism that operates in compliance with this Section.</b></p> <p>05 <b>The flashing operation shall not be terminated by removal or turn off of the controller unit or of the conflict monitor (malfunction management unit) or both.</b></p> <p>06 <b>A manual switch, a conflict monitor (malfunction management unit) circuit, and, if appropriate, automatic means shall be provided to initiate the flashing mode.</b></p> <p>Option: 07 Based on engineering study or engineering judgment, traffic control signals may be operated in the flashing mode on a scheduled basis during one or more periods of the day rather than operated continuously in the steady (stop-and-go) mode.</p> <p>Support: 08 Sections 4E.06 and 4E.09 contain information regarding the operation of pedestrian signal heads and accessible pedestrian signal detector pushbutton locator tones, respectively, during flashing operation.</p> <p><b>Section 4D.29 Flashing Operation – Transition Into Flashing Mode</b> Standard: 01 <b>The transition from steady (stop-and-go) mode to flashing mode, if initiated by a conflict monitor (malfunction management unit) or by a manual switch, shall be permitted to be made at any time.</b></p>	<p>visual conflict for road users in separately controlled turn lanes. Each traffic control signal shall be provided with an independent flasher mechanism that operates in compliance with this Section. The flashing operation shall not be terminated by removal or turn-off of the controller unit or of the conflict monitor (malfunction management unit) or both. A manual switch, a conflict monitor (malfunction management unit) circuit, and, if appropriate, automatic means shall be provided to initiate the flashing mode.</p> <p>Option: Based on engineering study or engineering judgment, traffic control signals may be operated in the flashing mode on a scheduled basis during one or more periods of the day rather than operated continuously in the steady (stop-and-go) mode.</p> <p><b>SUPPORT</b> Sections 4E.6 and 4E.9 contains information regarding the operation of pedestrian signal heads and accessible pedestrian signal detector pushbutton locator tones, respectively, during flashing operation.</p> <p><b>Section 4D.29 Flashing Operation – Transition Into Flashing Mode</b> Standard: The transition from steady (stop-and-go) mode to flashing mode, if initiated by a conflict</p>	<p>Relocated from 4D.12</p> <p>Recommend change per federal manual</p>
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<p>(stop-and-go) mode to flashing mode shall be made under either of the following circumstances:</p> <p>A. At the end of the common major-street red interval (such as just prior to the start of the green in both directions on the major street), or</p> <p>B. Directly from a <del>steady</del> CIRCULAR GREEN <del>or GREEN ARROW</del> signal indication to a flashing CIRCULAR YELLOW <del>or YELLOW ARROW</del> signal indication, <del>respectively</del> or from a GREEN ARROW signal indication to a flashing YELLOW ARROW signal indication, or from a flashing YELLOW ARROW signal indication (see Sections 4D.17 to 4D.24) to a flashing YELLOW ARROW signal indication in a different signal section</p> <p>.</p> <p>During programmed changes into flashing mode, no <del>steady</del> green signal indication or flashing yellow signal indication shall be terminated and immediately followed by a steady red or flashing red signal indication without first displaying the steady yellow signal indication.</p> <p><b>Section 4D.30 Flashing Operation – Signal Indications During Flashing Mode</b></p> <p><b>GUIDANCE</b></p> <p>When a traffic control signal is operated in the flashing mode, a flashing yellow signal indication should be used for the major street and a flashing red signal indication should be</p>	<p><b>02 Programmed changes from steady (stop-and-go) mode to flashing mode shall be made under either of the following circumstances:</b></p> <p><b>A. At the end of the common major-street red interval (such as just prior to the start of the green in both directions on the major street), or</b></p> <p><b>B. Directly from a CIRCULAR GREEN signal indication to a flashing CIRCULAR YELLOW signal indication, or from a GREEN ARROW signal indication to a flashing YELLOW ARROW signal indication, or from a flashing YELLOW ARROW signal indication (see Sections 4D.17 to 4D.24) to a flashing YELLOW ARROW signal indication in a different signal section.</b></p> <p><b>03 During programmed changes into flashing mode, no green signal indication or flashing yellow signal indication shall be terminated and immediately followed by a steady red or flashing red signal indication without first displaying the steady yellow signal indication.</b></p> <p><b>Section 4D.30 Flashing Operation – Signal Indications During Flashing Mode</b></p> <p><i>Guidance:</i></p> <p><i>01 When a traffic control signal is operated in the flashing mode, a flashing yellow signal indication should be used for the major street and a flashing red signal indication should be</i></p>	<p>monitor (malfunction management unit) or by a manual switch, shall be permitted to be made at any time. Programmed changes from steady (stop-and-go) mode to flashing mode shall be made under either of the following circumstances:</p> <p>A. At the end of the common major-street red interval (such as just prior to the start of the green in both directions on the major street), or</p> <p>B. Directly from a CIRCULAR GREEN signal indication to a flashing CIRCULAR YELLOW signal indication or from a GREEN ARROW signal indication to a flashing YELLOW ARROW signal indication, or from a flashing YELLOW ARROW signal indication (see Sections 4D.17 to 4D.24) to a flashing YELLOW ARROW signal indication in a different signal section</p> <p>.</p> <p>During programmed changes into flashing mode, no green signal indication or flashing yellow signal indication shall be terminated and immediately followed by a steady red or flashing red signal indication without first displaying the steady yellow signal indication.</p> <p><b>Section 4D.30 Flashing Operation – Signal Indications During Flashing Mode</b></p> <p><b>GUIDANCE</b></p> <p>When a traffic control signal is operated in the</p>	<p>Relocated from 4D.11 and 4D.12</p> <p>Recommend changing per federal manual</p> <p>Remove paragraph reference</p>
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<p>used for the other approaches unless flashing red signal indications are used on all approaches.</p> <p><b>STANDARD</b></p> <p><b>When a traffic control signal is operated in the flashing mode, all of the green signal indications at the signalized location shall be dark (non-illuminated) and shall not be displayed in either a steady or flashing manner, except for single-section GREEN ARROW signal indications as provided elsewhere in this Section.</b></p> <p><del>A.</del> Flashing yellow signal indications shall be used on more than one approach to a signalized location only if those approaches do not be displayed for approaches with conflicting traffic with each other movements, except for permissive left turn movements.</p> <p><del>B. At least</del> Except as provided below in Paragraph 5, when a traffic control signal is operated in the flashing mode, one and only one signal indication in each every signal face on an approach at the signalized location shall be flashed. <del>except in the following circumstance:</del></p> <p><b>Option:</b> If a signal face has two identical CIRCULAR RED or RED ARROW signal indications (see Section 4D.08), both of those identical signal indications may be flashed simultaneously.</p> <p><b>Standard:</b> No steady indications, other than a <del>A</del> single-section signal face consisting of a continuously <del>illuminated</del> displayed GREEN ARROW signal lens indication that is used alone to indicate a continuous movement in the steady (stop-and-go) mode, shall be displayed</p>	<p><i>used for the other approaches unless flashing red signal indications are used on all approaches.</i></p> <p><b>Standard:</b></p> <p>02 <b>When a traffic control signal is operated in the flashing mode, all of the green signal indications at the signalized location shall be dark (non-illuminated) and shall not be displayed in either a steady or flashing manner, except for single-section GREEN ARROW signal indications as provided elsewhere in this Section.</b></p> <p>03 <b>Flashing yellow signal indications shall be used on more than one approach to a signalized location only if those approaches do not conflict with each other.</b></p> <p>04 <b>Except as provided in Paragraph 5, when a traffic control signal is operated in the flashing mode, one and only one signal indication in every signal face at the signalized location shall be flashed.</b></p> <p><b>Option:</b> 05 If a signal face has two identical CIRCULAR RED or RED ARROW signal indications (see Section 4D.08), both of those identical signal indications may be flashed simultaneously.</p> <p><b>Standard:</b></p> <p>06 <b>No steady indications, other than a single-section signal face consisting of a continuously-displayed GREEN ARROW signal indication that is used alone to indicate a continuous movement in the steady (stop-and-go) mode, shall be displayed at the signalized location</b></p>	<p>flashing mode, a flashing yellow signal indication should be used for the major street and a flashing red signal indication should be used for the other approaches unless flashing red signal indications are used on all approaches.</p> <p><b>STANDARD</b></p> <p><b>When a traffic control signal is operated in the flashing mode, all of the green signal indications at the signalized location shall be dark (non-illuminated) and shall not be displayed in either a steady or flashing manner, except for single-section GREEN ARROW signal indications as provided elsewhere in this Section.</b></p> <p>Flashing yellow signal indications shall be used on more than one approach to a signalized location only if those approaches do not conflict with each other.</p> <p>Except as provided below, when a traffic control signal is operated in the flashing mode, one and only one signal indication in every signal face at the signalized location shall be flashed.</p> <p><b>Option:</b> If a signal face has two identical CIRCULAR RED or RED ARROW signal indications (see Section 4D.08), both of those identical signal indications may be flashed simultaneously.</p> <p><b>Standard:</b> No steady indications, other than a single-section signal face consisting of a continuously</p>	
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<p>at the signalized location during the flashing mode. A single-section GREEN ARROW signal indication shall remain continuously illuminated displayed when the traffic control signal is operated in the flashing mode.</p> <p><del>The following applications shall apply whenever a traffic control signal is operated in the flashing mode:</del></p> <p><del>A. Each approach or protected only mode turn movement that is controlled during steady mode (stop and go) operation shall display a signal indication during flashing operation.</del></p> <p><del>D.</del> If a signal face includes both circular and arrow signal lenses indications of the color that is to be flashed, only the circular signal indication shall be flashed.</p> <p><del>B.</del> All signal faces that are flashed on an approach shall flash the same color, either yellow or red, except that separate turn signal faces (see Sections 4D.17 and 4D.21) for protected only mode turn movements and separate signal faces for protected/permissive left turn movements shall be permitted to flash a CIRCULAR RED or RED ARROW signal indication when the adjacent through movement signal indications are flashed yellow. Shared signal faces (see Sections 4D.17 and 4D.21) for protected/permissive left turn movements shall not be permitted to flash a CIRCULAR RED signal indication when the adjacent through movement signal indications are flashed yellow.</p> <p><del>C.</del> The appropriate RED ARROW or YELLOW ARROW signal indication shall be flashed when a signal face consists entirely of arrow lenses indications. A signal face that consists entirely of arrow indications and that provides a protected only turn movement during the steady (stop-and-go) mode or that provides a flashing YELLOW ARROW or</p>	<p>during the flashing mode. A single-section GREEN ARROW signal indication shall remain continuously displayed when the traffic control signal is operated in the flashing mode.</p> <p>07 <b>If a signal face includes both circular and arrow signal indications of the color that is to be flashed, only the circular signal indication shall be flashed.</b></p> <p>08 <b>All signal faces that are flashed on an approach shall flash the same color, either yellow or red, except that separate turn signal faces (see Sections 4D.17 and 4D.21) shall be permitted to flash a RED ARROW signal indication when the adjacent through movement signal indications are flashed yellow. Shared signal faces (see Sections 4D.17 and 4D.21) for turn movements shall not be permitted to flash a CIRCULAR RED signal indication when the adjacent through movement signal indications are flashed yellow.</b></p> <p>09 <b>The appropriate RED ARROW or YELLOW ARROW signal indication shall be flashed when a signal face consists entirely of arrow indications. A signal face that consists entirely of arrow indications and that provides a protected only turn movement during the steady (stop-and-go) mode or that provides a flashing yellow arrow or flashing red arrow signal</b></p>	<p>displayed GREEN ARROW signal indication that is used alone to indicate a continuous movement in the steady (stop-and-go) mode, shall be displayed at the signalized location during the flashing mode. A single-section GREEN ARROW signal indication shall remain continuously displayed when the traffic control signal is operated in the flashing mode.</p> <p>If a signal face includes both circular and arrow signal indications of the color that is to be flashed, only the circular signal indication shall be flashed.</p> <p>All signal faces that are flashed on an approach shall flash the same color, either yellow or red, except that separate turn signal faces (see Sections 4D.17 and 4D.21) shall be permitted to flash a RED ARROW signal indication when the adjacent through movement signal indications are flashed yellow. Shared signal faces (see Sections 4D.17 and 4D.21) for turn movements shall not be permitted to flash a CIRCULAR RED signal indication when the adjacent through movement signal indications are flashed yellow.</p> <p>The appropriate RED ARROW or YELLOW ARROW signal indication shall be flashed when a signal face consists entirely of arrow indications. A signal face that consists entirely of arrow indications and that provides a</p>	<p>Relocated from 4D.12</p> <p>Recommend change</p>
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flashing RED ARROW signal indication for a permissive turn movement during the steady (stop-and-go) mode shall be permitted to flash the YELLOW ARROW signal indication during the flashing mode if the adjacent through movement signal indications are flashed yellow and if it is intended that a permissive turn movement not requiring a full stop by each turning vehicle be provided during the flashing mode.

#### Section 4D.31 Flashing Operation – Transition Out of Flashing Mode

Standard:

All changes ~~Changes~~ from flashing mode to steady (stop-and-go) mode shall be made under one of the following procedures:

A. Yellow-red flashing mode: Changes from flashing mode to steady (stop-and-go) mode shall be made at the beginning of the major-street green interval (when a green signal indication is ~~shown~~ displayed to through traffic in both directions on the major street), or if there is no common major-street green interval, at the beginning of the green interval for the major traffic movement on the major street.

B. Red-red flashing mode: Changes from flashing mode to steady (stop-and-go) mode shall be made by changing the flashing red indications to steady red indications followed by appropriate green indications to begin the steady mode cycle. These green indications shall be the beginning of the major-street green interval (when a green signal indication is ~~shown~~ displayed to through traffic in both directions on the major street) or if there is no common major-street green interval, at the

indication for a permissive turn movement during the steady (stop-and-go) mode shall be permitted to flash the YELLOW ARROW signal indication during the flashing mode if the adjacent through movement signal indications are flashed yellow and if it is intended that a permissive turn movement not requiring a full stop by each turning vehicle be provided during the flashing mode.

#### Section 4D.31 Flashing Operation – Transition Out of Flashing Mode Standard:

<sup>01</sup> All changes from flashing mode to steady (stop-and-go) mode shall be made under one of the following procedures:

**A. Yellow-red flashing mode: Changes from flashing mode to steady (stop-and-go) mode shall be made at the beginning of the major-street green interval (when a green signal indication is displayed to through traffic in both directions on the major street), or if there is no common major-street green interval, at the beginning of the green interval for the major traffic movement on the major street.**

**B. Red-red flashing mode: Changes from flashing mode to steady (stop-and-go) mode shall be made by changing the flashing red indications to steady red indications followed by appropriate green indications to begin the steady mode cycle. These green indications shall be the beginning of the major-street green interval (when a green signal indication is displayed to through traffic in both directions on the major street) or if there is no common major-street**

protected only turn movement during the steady (stop-and-go) mode or that provides a flashing YELLOW ARROW or flashing RED ARROW signal indication for a permissive turn movement during the steady (stop-and-go) mode shall be permitted to flash the YELLOW ARROW signal indication during the flashing mode if the adjacent through movement signal indications are flashed yellow and if it is intended that a permissive turn movement not requiring a full stop by each turning vehicle be provided during the flashing mode.

#### Section 4D.31 Flashing Operation – Transition Out of Flashing Mode

Standard:

All changes from flashing mode to steady (stop-and-go) mode shall be made under one of the following procedures:

A. Yellow-red flashing mode: Changes from flashing mode to steady (stop-and-go) mode shall be made at the beginning of the major-street green interval (when a green signal indication is displayed to through traffic in both directions on the major street), or if there is no common major-street green interval, at the beginning of the green interval for the major traffic movement on the major street.

B. Red-red flashing mode: Changes from flashing mode to steady (stop-and-go) mode shall be made by changing the flashing red indications to steady red indications followed by appropriate green indications to begin the steady mode cycle. These green indications shall be the beginning of the major-street green interval (when a green signal indication is

<p>beginning of the green interval for the major traffic movement on the major street.</p> <p><b>GUIDANCE</b></p> <p>The steady red clearance interval provided during the change from red-red flashing mode to steady (stop and go) mode should have a duration of 6 seconds.</p> <p>COMPLIANCE DATE: DECEMBER 22, 2013</p> <p>When changing from the yellow-red flashing mode to steady (stop-and-go) mode, if there is no common major-street green interval, the provision of a steady red clearance interval for the other approaches before changing from a flashing yellow or a flashing red signal indication to a green signal indication on the major approach should be considered.</p> <p><b>Standard:</b>  <b>During programmed changes out of flashing mode, no flashing yellow signal indication shall be terminated and immediately followed by a steady red or flashing red signal indication without first displaying the steady yellow signal indication.</b></p> <p><b>Option:</b>  Because special midblock signals that rest in flashing circular yellow in the position normally occupied by the green signal indication do not have a green signal indication in the signal face, these signals may go directly from flashing circular yellow (in the position normally occupied by the green signal indication) to steady yellow without going first to a green signal indication.</p> <p><del>4D.20</del> 4D.32 Temporary and Portable</p>	<p><b>green interval, at the beginning of the green interval for the major traffic movement on the major street.</b></p> <p><i>Guidance:</i></p> <p>02 <i>The steady red clearance interval provided during the change from red-red flashing mode to steady (stop-and-go) mode should have a duration of 6 seconds.</i></p> <p>03 <i>When changing from the yellow-red flashing mode to steady (stop-and-go) mode, if there is no common major-street green interval, the provision of a steady red clearance interval for the other approaches before changing from a flashing yellow or a flashing red signal indication to a green signal indication on the major approach should be considered.</i></p> <p><b>Standard:</b></p> <p>04 <b>During programmed changes out of flashing mode, no flashing yellow signal indication shall be terminated and immediately followed by a steady red or flashing red signal indication without first displaying the steady yellow signal indication.</b></p> <p><b>Option:</b></p> <p>05 Because special midblock signals that rest in flashing circular yellow in the position normally occupied by the green signal indication do not have a green signal indication in the signal face, these signals may go directly from flashing circular yellow (in the position normally occupied by the green signal indication) to steady yellow without going first to a green signal indication.</p> <p><b>Section 4D.32 Temporary and Portable Traffic Control Signals</b></p>	<p>displayed to through traffic in both directions on the major street) or if there is no common major-street green interval, at the beginning of the green interval for the major traffic movement on the major street.</p> <p><b>GUIDANCE</b></p> <p>The steady red clearance interval provided during the change from red-red flashing mode to steady (stop and go) mode should have a duration of 6 seconds.</p> <p>COMPLIANCE DATE: DECEMBER 22, 2013</p> <p>When changing from the yellow-red flashing mode to steady (stop-and-go) mode, if there is no common major-street green interval, the provision of a steady red clearance interval for the other approaches before changing from a flashing yellow or a flashing red signal indication to a green signal indication on the major approach should be considered.</p> <p><b>Standard:</b>  <b>During programmed changes out of flashing mode, no flashing yellow signal indication shall be terminated and immediately followed by a steady red or flashing red signal indication without first displaying the steady yellow signal indication.</b></p> <p><b>Option:</b>  Because special midblock signals that rest in flashing circular yellow in the position normally occupied by the green signal indication do not have a green signal indication in the signal face, these signals may go directly from flashing circular yellow (in the position normally occupied by the green signal indication) to steady yellow without going first to a green signal indication.</p>	<p>Recommend change</p>
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<p>Traffic Control Signals</p> <p><del>STANDARD</del>  <del>A temporary traffic control signal shall be defined as a traffic control signal that is installed for a limited time period. A portable traffic control signal shall be defined as a temporary traffic control signal that is designed so that it can be easily transported and reused at different locations.</del></p> <p>SUPPORT  A temporary traffic control signal is generally installed using methods that minimize the costs of installation, relocation, and/or removal. Typical temporary traffic control signals are for specific purposes, such as for one lane, two-way facilities in temporary traffic control zones (see Chapter 4GH), for a haul-road intersection, or for access to a site that will have a permanent access point developed at another location in the near future.</p> <p>STANDARD  Advance signing shall be used when employing a temporary traffic control signal. A temporary traffic control signal shall:  A. Meet the physical display and operational requirements of a conventional traffic control signal.  B. Be removed when no longer needed.  C. Be placed in the flashing mode when not being used if it will be operated in the steady mode within 5 working days; otherwise, it shall be removed.  D. Be placed in the flashing mode during periods when it is not desirable to operate the signal, or the signal heads shall be covered, turned, or taken down to indicate that the signal is not in operation.</p> <p>GUIDANCE</p>	<p>Support:  01 A temporary traffic control signal is generally installed using methods that minimize the costs of installation, relocation, and/or removal. Typical temporary traffic control signals are for specific purposes, such as for one-lane, two-way facilities in temporary traffic control zones (see Chapter 4H), for a haul-road intersection, or for access to a site that will have a permanent access point developed at another location in the near future.</p> <p><b>Standard:</b>  02 <b>Advance signing shall be used when employing a temporary traffic control signal.</b>  03 <b>A temporary traffic control signal shall:</b>  <b>A. Meet the physical display and operational requirements of a conventional traffic control signal.</b>  <b>B. Be removed when no longer needed.</b>  <b>C. Be placed in the flashing mode when not being used if it will be operated in the steady mode within 5 working days; otherwise, it shall be removed.</b>  <b>D. Be placed in the flashing mode during periods when it is not desirable to operate the signal, or the signal heads shall be covered, turned, or taken down to indicate that the signal is not in operation.</b></p> <p><i>Guidance:</i></p>	<p>4D.32 Temporary and Portable Traffic Control Signals</p> <p>SUPPORT  A temporary traffic control signal is generally installed using methods that minimize the costs of installation, relocation, and/or removal. Typical temporary traffic control signals are for specific purposes, such as for one lane, two-way facilities in temporary traffic control zones (see Chapter 4H), for a haul-road intersection, or for access to a site that will have a permanent access point developed at another location in the near future.</p> <p>STANDARD  Advance signing shall be used when employing a temporary traffic control signal. A temporary traffic control signal shall:  A. Meet the physical display and operational requirements of a conventional traffic control signal.  B. Be removed when no longer needed.  C. Be placed in the flashing mode when not being used if it will be operated in the steady mode within 5 working days; otherwise, it shall be removed.  D. Be placed in the flashing mode during periods when it is not desirable to operate the signal, or the signal heads shall be covered, turned, or taken down to indicate that the signal is not in operation.</p> <p>GUIDANCE  A temporary traffic control signal should be used only if engineering judgment indicates that installing the signal will improve the overall safety and/or operation of the location.</p>	<p>Recommend change</p>
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<p>A temporary traffic control signal should be used only if engineering judgment indicates that installing the signal will improve the overall safety and/or operation of the location. The use of temporary traffic control signals by a work crew on a regular basis in their work area should be subject to the approval of the jurisdiction having authority over the roadway. A temporary traffic control signal should not operate longer than 30 days unless associated with a longer term temporary traffic control zone project. For use of temporary traffic control signals in temporary traffic control zones, reference should be made to Section 6F.8084.</p> <p><del>4D.19</del> 4D.33 Lateral Placement Offset of Signal Supports and Cabinets</p> <p>GUIDANCE</p> <p>The following items should be considered when placing signal supports and cabinets:</p> <p>A. Reference should be made to the American Association of State Highway and Transportation Officials (AASHTO) “Roadside Design Guide” (see Section 1A.11) and to the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).</p> <p>B. Signal supports should be placed as far as practical from the edge of the traveled way without adversely affecting the visibility of the signal indications.</p> <p>C. Where supports cannot be located based on the recommended AASHTO clearances, consideration should be given to the use of appropriate safety devices.</p> <p>D. No part of a concrete base for a signal</p>	<p>04 <i>A temporary traffic control signal should be used only if engineering judgment indicates that installing the signal will improve the overall safety and/or operation of the location.</i></p> <p>05 <i>The use of temporary traffic control signals by a work crew on a regular basis in their work area should be subject to the approval of the jurisdiction having authority over the roadway.</i></p> <p>06 <i>A temporary traffic control signal should not operate longer than 30 days unless associated with a longer-term temporary traffic control zone project.</i></p> <p>07 <i>For use of temporary traffic control signals in temporary traffic control zones, reference should be made to Section 6F.84.</i></p> <p><b>Section 4D.33 Lateral Offset of Signal Supports and Cabinets</b></p> <p><i>Guidance:</i></p> <p>01 <i>The following items should be considered when placing signal supports and cabinets:</i></p> <p><i>A. Reference should be made to the American Association of State Highway and Transportation Officials (AASHTO) “Roadside Design Guide” (see Section 1A.11) and to the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).</i></p> <p><i>B. Signal supports should be placed as far as practical from the edge of the traveled way without adversely affecting the visibility of the signal indications.</i></p> <p><i>C. Where supports cannot be located based on the recommended AASHTO clearances, consideration should be given to the use of appropriate safety devices.</i></p> <p><i>D. No part of a concrete base for a signal</i></p>	<p>The use of temporary traffic control signals by a work crew on a regular basis in their work area should be subject to the approval of the jurisdiction having authority over the roadway. A temporary traffic control signal should not operate longer than 30 days unless associated with a longer term temporary traffic control zone project. For use of temporary traffic control signals in temporary traffic control zones, reference should be made to Section 6F.84.</p> <p>4D.33 Lateral Offset of Signal Supports and Cabinets</p> <p>GUIDANCE</p> <p>The following items should be considered when placing signal supports and cabinets:</p> <p>A. Reference should be made to the American Association of State Highway and Transportation Officials (AASHTO) “Roadside Design Guide” (see Section 1A.11) and to the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).</p> <p>B. Signal supports should be placed as far as practical from the edge of the traveled way without adversely affecting the visibility of the signal indications.</p> <p>C. Where supports cannot be located based on the recommended AASHTO clearances,</p>	<p>Recommend changes with MN language</p> <p>New Mn language</p>
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<p>support should extend more than 100 mm (4 in) above the ground level at any point. This limitation does not apply to the concrete base for a rigid support.</p> <p><del>C.</del> E. In order to minimize hindrance to the passage of persons with physical disabilities, a signal support or controller cabinet should not obstruct the sidewalk, or access from the sidewalk to the crosswalk.</p> <p><del>D.</del> F. Controller cabinets should be located as far as practical from the edge of the roadway.</p> <p><del>E.</del> G. On medians, the <del>above</del> minimum clearances <del>provided in Items A through E</del> for signal supports should be obtained if practical.</p> <p><del>4D.21</del> 4D.34 <del>Traffic-Signal</del> Use of Signs, <del>Auxiliary</del> at Signalized Locations</p> <p>SUPPORT</p> <p>Traffic signal signs are sometimes used at highway traffic signal locations to instruct, <b>regulate</b> or guide pedestrians, bicyclists, or motorists. Among the signs typically used at or on the approaches to signalized locations are movement prohibition signs (see Section 2B.18), lane control signs (see Sections 2B.19 to 2B.22), pedestrian crossing signs (see Section 2B.51), pedestrian actuation signs (see Section 2B.52), traffic signal signs (see Sections 2B.53 and 2C.48), Signal Ahead warning signs (see Section 2C.36), Street Name signs (see Section 2D.43), and Advance Street Name signs (see Section 2D.44).</p> <p>GUIDANCE</p> <p>Regulatory, warning, and guide signs should be</p>	<p><i>support should extend more than 4 inches above the ground level at any point. This limitation does not apply to the concrete base for a rigid support.</i></p> <p><i>E. In order to minimize hindrance to the passage of persons with physical disabilities, a signal support or controller cabinet should not obstruct the sidewalk, or access from the sidewalk to the crosswalk.</i></p> <p><i>F. Controller cabinets should be located as far as practical from the edge of the roadway.</i></p> <p><i>G. On medians, the minimum clearances provided in Items A through E for signal supports should be obtained if practical.</i></p> <p><b>Section 4D.34 Use of Signs at Signalized Locations</b></p> <p>Support:</p> <p>01 Traffic signal signs are sometimes used at highway traffic signal locations to instruct or guide pedestrians, bicyclists, or motorists. Among the signs typically used at or on the approaches to signalized locations are movement prohibition signs (see Section 2B.18), lane control signs (see Sections 2B.19 to 2B.22), pedestrian crossing signs (see Section 2B.51), pedestrian actuation signs (see Section 2B.52), traffic signal signs (see Sections 2B.53 and 2C.48), Signal Ahead warning signs (see Section 2C.36), Street Name signs (see Section 2D.43), and Advance Street Name signs (see Section 2D.44).</p> <p><i>Guidance:</i></p> <p>02 <i>Regulatory, warning, and guide signs should be used at traffic control signal locations as provided in Part 2 and as specifically provided</i></p>	<p>consideration should be given to the use of appropriate safety devices.</p> <p>D. No part of a concrete base for a signal support should extend more than 100 mm (4 in) above the ground level at any point. This limitation does not apply to the concrete base for a rigid support.</p> <p>E. In order to minimize hindrance to the passage of persons with physical disabilities, a signal support or controller cabinet should not obstruct the sidewalk, or access from the sidewalk to the crosswalk.</p> <p>F. Controller cabinets should be located as far as practical from the edge of the roadway.</p> <p>G. On medians, the minimum clearances provided in Items A through E for signal supports should be obtained if practical.</p> <p>4D.34 Use of Sign at Signalized Locations</p> <p>SUPPORT</p> <p>Traffic signal signs are sometimes used at highway traffic signal locations to instruct, <b>regulate</b> or guide pedestrians, bicyclists, or motorists. Among the signs typically used at or on the approaches to signalized locations are movement prohibition signs (see Section 2B.18), lane control signs (see Sections 2B.19 to 2B.22), pedestrian crossing signs (see Section 2B.51), pedestrian actuation signs (see Section 2B.52), traffic signal signs (see Sections 2B.53 and 2C.48), Signal Ahead warning signs (see Section 2C.36), Street Name signs (see Section 2D.43), and Advance Street Name signs (see Section 2D.44).</p>	<p>Existing Mn language</p>
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<p>used at traffic control signal locations as provided in Part 2 and as specifically provided elsewhere in Part 4.</p> <p><b>When a traffic signal sign at a highway traffic signal is applicable to a particular signal face, the sign should be located adjacent to the signal face to which it applies.</b></p> <p>Support: Section 2B.19 contains information regarding the use of overhead lane control signs on signalized approaches where lane drops, multiple-lane turns involving shared through-and-turn lanes, or other lane-use regulations that would be unexpected by unfamiliar road users are present.</p> <p>Standard:</p> <p>If used, illuminated traffic signal signs shall be designed and mounted in such a manner as to avoid glare and reflections that seriously detract from the signal indications. Traffic control signal faces shall be given dominant position and brightness to maximize their priority in the overall display.</p> <p>The minimum vertical clearance and horizontal clearance offset of the total assembly of traffic signal signs (see Section 2B.4553) shall conform to comply with the provisions of Sections 4D.1715 and 4D.16.</p> <p>STOP signs shall not be used in conjunction with any traffic control signal operation, except in either of the following cases:</p> <p>A. If the signal indication for an approach is a</p>	<p>elsewhere in Part 4.</p> <p>03 <i>Traffic signal signs should be located adjacent to the signal face to which they apply.</i></p> <p>Support:</p> <p>04 Section 2B.19 contains information regarding the use of overhead lane control signs on signalized approaches where lane drops, multiple-lane turns involving shared through-and-turn lanes, or other lane-use regulations that would be unexpected by unfamiliar road users are present.</p> <p><b>Standard:</b></p> <p>05 <b>If used, illuminated traffic signal signs shall be designed and mounted in such a manner as to avoid glare and reflections that seriously detract from the signal indications. Traffic control signal faces shall be given dominant position and brightness to maximize their priority in the overall display.</b></p> <p>06 <b>The minimum vertical clearance and horizontal offset of the total assembly of traffic signal signs (see Section 2B.53) shall comply with the provisions of Sections 4D.15 and 4D.16.</b></p> <p>07 <b>STOP signs shall not be used in conjunction with any traffic control signal operation, except in either of the following cases:</b></p> <p><b>A. If the signal indication for an approach is a flashing red at all times, or</b></p> <p><b>B. If a minor street or driveway is located within or adjacent to the area controlled by the traffic control signal, but does not require separate traffic signal control because an extremely low potential for conflict exists.</b></p>	<p><b>GUIDANCE</b></p> <p>Regulatory, warning, and guide signs should be used at traffic control signal locations as provided in Part 2 and as specifically provided elsewhere in Part 4.</p> <p><b>When a traffic signal sign at a highway traffic signal is applicable to a particular signal face, the sign should be located adjacent to the signal face to which it applies.</b></p> <p>Support: Section 2B.19 contains information regarding the use of overhead lane control signs on signalized approaches where lane drops, multiple-lane turns involving shared through-and-turn lanes, or other lane-use regulations that would be unexpected by unfamiliar road users are present.</p> <p>Standard:</p> <p>If used, illuminated traffic signal signs shall be designed and mounted in such a manner as to avoid glare and reflections that seriously detract from the signal indications. Traffic control signal faces shall be given dominant position and brightness to maximize their priority in the overall display.</p> <p>The minimum vertical clearance and horizontal offset of the total assembly of traffic signal signs (see Section 2B.53) shall comply with the provisions of Sections 4D.15 and 4D.16.</p> <p>STOP signs shall not be used in conjunction with any traffic control signal operation, except in either of the following cases:</p>	<p>Recommend change</p>
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<p>flashing red at all times; or</p> <p>B. If a minor street or driveway is located within or adjacent to the area controlled by the traffic control signal, but does not require separate traffic signal control because an extremely low potential for conflict exists.</p> <p><b>Section 4D.35 Use of Pavement Markings at Signalized Locations</b></p> <p><b>SUPPORT</b> Pavement markings (see Part 3) that clearly communicate the operational plan of an intersection to road users play an important role in the effective operation of traffic control signals. By designating the number of lanes, the use of each lane, the length of additional lanes on the approach to an intersection, and the proper stopping points, the engineer can design the signal phasing and timing to best match the goals of the operational plan.</p> <p><b>GUIDANCE</b> Pavement markings should be used at traffic control signal locations as provided in Part 3. If the road surface will not retain pavement markings, signs should be installed to provide the needed road user information.</p> <p><b>CHAPTER 4E PEDESTRIAN CONTROL FEATURES</b></p> <p><b>Section 4E.1 Pedestrian Signal Heads</b></p> <p><b>SUPPORT</b> Pedestrian signal heads provide special types of traffic signal indications exclusively</p>	<p><b>Section 4D.35 Use of Pavement Markings at Signalized Locations</b></p> <p><b>Support:</b> 01 Pavement markings (see Part 3) that clearly communicate the operational plan of an intersection to road users play an important role in the effective operation of traffic control signals. By designating the number of lanes, the use of each lane, the length of additional lanes on the approach to an intersection, and the proper stopping points, the engineer can design the signal phasing and timing to best match the goals of the operational plan.</p> <p><i>Guidance:</i> 02 Pavement markings should be used at traffic control signal locations as provided in Part 3. <i>If the road surface will not retain pavement markings, signs should be installed to provide the needed road user information.</i></p> <p><b>CHAPTER 4E. PEDESTRIAN CONTROL FEATURES</b></p> <p><b>Section 4E.01 Pedestrian Signal Heads</b></p> <p><b>Support:</b> 01 Pedestrian signal heads provide special types of traffic signal indications exclusively</p>	<p>A. If the signal indication for an approach is a flashing red at all times; or</p> <p>B. If a minor street or driveway is located within or adjacent to the area controlled by the traffic control signal, but does not require separate traffic signal control because an extremely low potential for conflict exists.</p> <p><b>Section 4D.35 Use of Pavement Markings at Signalized Locations</b></p> <p><b>SUPPORT</b> Pavement markings (see Part 3) that clearly communicate the operational plan of an intersection to road users play an important role in the effective operation of traffic control signals. By designating the number of lanes, the use of each lane, the length of additional lanes on the approach to an intersection, and the proper stopping points, the engineer can design the signal phasing and timing to best match the goals of the operational plan.</p> <p><b>GUIDANCE</b> Pavement markings should be used at traffic control signal locations as provided in Part 3. If the road surface will not retain pavement markings, signs should be installed to provide the needed road user information.</p> <p><b>CHAPTER 4E PEDESTRIAN CONTROL FEATURES</b></p> <p><b>Section 4E.1 Pedestrian Signal Heads</b></p>	<p>Recommend adding language</p> <p>Add Mn language</p> <p>Recommend adding federal language</p>
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<p>intended for controlling pedestrian traffic. These signal indications consist of the illuminated symbols of a WALKING PERSON (symbolizing WALK) and an UPRAISED HAND (symbolizing DONT WALK).</p> <p><b>GUIDANCE</b>  <b>Except when required by this manual,</b> engineering judgment should determine the need for separate pedestrian signal heads (see Section 4D.3) and accessible pedestrian signals (see Section 4E.6).</p> <p><b>Support:</b>  Chapter 4F contains information regarding the use of pedestrian hybrid beacons and Chapter 4N contains information regarding the use of In-Roadway Warning Lights at unsignalized marked crosswalks.</p> <p>4E.2 Meaning of Pedestrian Signal Head Indications</p> <p><b>STANDARD</b>  Pedestrian signal head indications shall have the following meanings:</p> <p>A. A steady WALKING PERSON (symbolizing WALK) signal indication means that a pedestrian facing the signal indication is permitted to start to cross the roadway in the direction of the signal indication, possibly in conflict with turning vehicles. The pedestrian shall yield the right-of-way to vehicles lawfully within the intersection at the time that the WALKING PERSON (symbolizing WALK) signal indication is first shown.</p>	<p>intended for controlling pedestrian traffic. These signal indications consist of the illuminated symbols of a WALKING PERSON (symbolizing WALK) and an UPRAISED HAND (symbolizing DONT WALK).</p> <p><i>Guidance:</i>  02 <i>Engineering judgment should determine the need for separate pedestrian signal heads (see Section 4D.03) and accessible pedestrian signals (see Section 4E.09).</i></p> <p><b>Support:</b>  03 Chapter 4F contains information regarding the use of pedestrian hybrid beacons and Chapter 4N contains information regarding the use of In-Roadway Warning Lights at unsignalized marked crosswalks.</p> <p><b>Section 4E.02 Meaning of Pedestrian Signal Head Indications</b>  <b>Standard:</b>  01 <b>Pedestrian signal head indications shall have the following meanings:</b>  <b>A. A steady WALKING PERSON (symbolizing WALK) signal indication means that a pedestrian facing the signal indication is permitted to start to cross the roadway in the direction of the signal indication, possibly in conflict with turning vehicles. The pedestrian shall yield the right-of-way to vehicles lawfully within the intersection at the time that the WALKING PERSON (symbolizing WALK) signal indication is first shown.</b>  <b>B. A flashing UPRAISED HAND (symbolizing DONT WALK) signal</b></p>	<p><b>SUPPORT</b>  Pedestrian signal heads provide special types of traffic signal indications exclusively intended for controlling pedestrian traffic. These signal indications consist of the illuminated symbols of a WALKING PERSON (symbolizing WALK) and an UPRAISED HAND (symbolizing DONT WALK).</p> <p><b>GUIDANCE</b>  <b>Except when required by this manual,</b> engineering judgment should determine the need for separate pedestrian signal heads (see Section 4D.3) and accessible pedestrian signals (see Section 4E.6).</p> <p><b>Support:</b>  Chapter 4F contains information regarding the use of pedestrian hybrid beacons and Chapter 4N contains information regarding the use of In-Roadway Warning Lights at unsignalized marked crosswalks.</p> <p>4E.2 Meaning of Pedestrian Signal Head Indications</p> <p><b>STANDARD</b>  Pedestrian signal head indications shall have the following meanings:</p> <p>A. A steady WALKING PERSON (symbolizing WALK) signal indication means that a pedestrian facing the signal indication is permitted to start to cross the roadway in the direction of the signal indication, possibly in conflict with turning vehicles. The pedestrian shall yield the right-of-way to vehicles lawfully within the intersection at the time that the</p>	<p>Recommend</p>
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<p>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 <del>out</del> to the far side of the traveled way of the street or highway, unless otherwise directed by a traffic control device to proceed only to the median of a divided highway or only to some other island or pedestrian refuge area.</p> <p>C. A steady UPRAISED HAND (symbolizing DONT WALK) signal indication means that a pedestrian shall not enter the roadway in the direction of the signal indication.</p> <p>D. A flashing WALKING PERSON (symbolizing WALK) signal indication has no meaning and shall not be used.</p> <p>4E.3 Application of Pedestrian Signal Heads</p> <p>STANDARD</p> <p>Pedestrian signal heads shall be used in conjunction with vehicular traffic control signals under any of the following conditions:</p> <p>A. If a traffic control signal is justified by an engineering study and meets either Warrant 4, Pedestrian Volume or Warrant 5, School Crossing (see Chapter 4C);</p> <p>B. If an exclusive signal phase is provided or made available for pedestrian movements in one or more directions, with all conflicting vehicular movements being stopped;</p>	<p><b>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 to the far side of the traveled way of the street or highway, unless otherwise directed by a traffic control device to proceed only to the median of a divided highway or only to some other island or pedestrian refuge area.</b></p> <p><b>C. A steady UPRAISED HAND (symbolizing DONT WALK) signal indication means that a pedestrian shall not enter the roadway in the direction of the signal indication.</b></p> <p><b>D. A flashing WALKING PERSON (symbolizing WALK) signal indication has no meaning and shall not be used.</b></p> <p><b>Section 4E.03 Application of Pedestrian Signal Heads</b></p> <p><b>Standard:</b></p> <p><b>01 Pedestrian signal heads shall be used in conjunction with vehicular traffic control signals under any of the following conditions:</b></p> <p><b>A. If a traffic control signal is justified by an engineering study and meets either Warrant 4, Pedestrian Volume or Warrant 5, School Crossing (see Chapter 4C);</b></p> <p><b>B. If an exclusive signal phase is provided or made available for pedestrian movements in one or more directions, with all conflicting vehicular movements being stopped;</b></p> <p><b>C. At an established school crossing at any</b></p>	<p>WALKING PERSON (symbolizing WALK) signal indication is first shown.</p> <p>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 to the far side of the traveled way of the street or highway, unless otherwise directed by a traffic control device to proceed only to the median of a divided highway or only to some other island or pedestrian refuge area.</p> <p>C. A steady UPRAISED HAND (symbolizing DONT WALK) signal indication means that a pedestrian shall not enter the roadway in the direction of the signal indication.</p> <p>D. A flashing WALKING PERSON (symbolizing WALK) signal indication has no meaning and shall not be used.</p> <p>4E.3 Application of Pedestrian Signal Heads</p> <p>STANDARD</p> <p>Pedestrian signal heads shall be used in conjunction with vehicular traffic control signals under any of the following conditions:</p> <p>A. If a traffic control signal is justified by an engineering study and meets either Warrant 4, Pedestrian Volume or Warrant 5, School Crossing (see Chapter 4C);</p> <p>B. If an exclusive signal phase is provided or made available for pedestrian movements in</p>	<p>updating language</p>
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<p>C. At an established school crossing at any signalized location; or  D. Where engineering judgment determines that multiphase signal indications (as with split-phase timing) would tend to confuse or cause conflicts with pedestrians using a crosswalk guided only by vehicular signal indications.</p> <p><b>GUIDANCE</b>  Pedestrian signal heads should be used under any of the following conditions:  A. If it is necessary to assist pedestrians in <b>making a reasonably safe crossing</b> <b>deciding when to begin crossing the roadway in the chosen direction</b> or if engineering judgment determines that pedestrian signal heads are justified to minimize vehicle-pedestrian conflicts;  B. If pedestrians are permitted to cross a portion of a street, such as to or from a median of sufficient width for pedestrians to wait, during a particular interval but are not permitted to cross the remainder of the street during any part of the same interval; and/or  C. If no vehicular signal indications are visible to pedestrians, or if the vehicular signal indications that are visible to pedestrians starting <b>or continuing</b> a crossing provide insufficient guidance for them to decide when <b>it is reasonably safe to cross</b> <b>begin crossing the roadway in the chosen direction</b>, such as on one-way streets, at T-intersections, or at multi-phase signal operations.  <b>Option:</b>  Pedestrian signal heads may be used under other conditions based on engineering judgment.</p>	<p><b>signalized location; or</b>  <b>D. Where engineering judgment determines that multi-phase signal indications (as with split-phase timing) would tend to confuse or cause conflicts with pedestrians using a crosswalk guided only by vehicular signal indications.</b></p> <p><i>Guidance:</i>  02 Pedestrian signal heads should be used under any of the following conditions:  A. If it is necessary to assist pedestrians in deciding when to begin crossing the roadway in the chosen direction or if engineering judgment determines that pedestrian signal heads are justified to minimize vehicle-pedestrian conflicts;  B. If pedestrians are permitted to cross a portion of a street, such as to or from a median of sufficient width for pedestrians to wait, during a particular interval but are not permitted to cross the remainder of the street during any part of the same interval; and/or  C. If no vehicular signal indications are visible to pedestrians, or if the vehicular signal indications that are visible to pedestrians starting a crossing provide insufficient guidance for them to decide when to begin crossing the roadway in the chosen direction, such as on one-way streets, at T-intersections, or at multi-phase signal operations.  <b>Option:</b>  03 Pedestrian signal heads may be used under other conditions based on engineering judgment.</p>	<p>one or more directions, with all conflicting vehicular movements being stopped;  C. At an established school crossing at any signalized location; or  D. Where engineering judgment determines that multiphase signal indications (as with split-phase timing) would tend to confuse or cause conflicts with pedestrians using a crosswalk guided only by vehicular signal indications.</p> <p><b>GUIDANCE</b>  Pedestrian signal heads should be used under any of the following conditions:  A. If it is necessary to assist pedestrians in deciding when to begin crossing the roadway in the chosen direction or if engineering judgment determines that pedestrian signal heads are justified to minimize vehicle-pedestrian conflicts;  B. If pedestrians are permitted to cross a portion of a street, such as to or from a median of sufficient width for pedestrians to wait, during a particular interval but are not permitted to cross the remainder of the street during any part of the same interval; and/or  C. If no vehicular signal indications are visible to pedestrians, or if the vehicular signal indications that are visible to pedestrians starting a crossing provide insufficient guidance for them to decide when to begin crossing the roadway in the chosen direction, such as on one-way streets, at T-intersections, or at multi-phase signal operations.  <b>Option:</b>  Pedestrian signal heads may be used under other conditions based on engineering judgment.</p>	<p>Recommend changes Standard at end of Fed manual was taken out previously and should remain out (animated eyes)</p> <p>Add Mn text</p>
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<p>4E.4 Size, Design, and Illumination of Pedestrian Signal Head Indications</p> <p>STANDARD</p> <p>All new pedestrian signal head indications shall be displayed within a rectangular background and shall consist of symbolized messages (see Figure 4E-1), except that existing pedestrian signal head indications with lettered or outline style symbol messages <del>may</del> shall be permitted to be retained for the remainder of their useful service life. The symbol designs that are set forth in the <b>Federal</b> “Standard Highway Signs and Markings” book shall be used.</p> <p>Each pedestrian signal head indication shall be independently <del>illuminated</del> displayed and emit a single color.</p> <p><del>If a two-section pedestrian signal had is used, the</del> <b>The</b> UPRAISED HAND (symbolizing DONT WALK) signal section shall be mounted directly above <del>or integral with</del> the WALKING PERSON (symbolizing WALK) signal section. <del>If a one-section pedestrian signal head is used, the symbols shall be either overlaid upon each other or arranged side-by-side with the UPRAISED HAND symbol to the left of the WALKING PERSON symbol, and a light source that can display each symbol independently shall be used.</del></p> <p>The WALKING PERSON (symbolizing WALK) signal indication shall be white, conforming to the publication entitled “Pedestrian Traffic Control Signal Indications” (see Section 1A.11), with all except the symbol obscured by an opaque material.</p> <p>The UPRAISED HAND (symbolizing DONT WALK) signal indication shall be Portland</p>	<p><b>Section 4E.04 Size, Design, and Illumination of Pedestrian Signal Head Indications</b></p> <p><b>Standard:</b></p> <p><b>01 All new pedestrian signal head indications shall be displayed within a rectangular background and shall consist of symbolized messages (see Figure 4E-1), except that existing pedestrian signal head indications with lettered or outline style symbol messages shall be permitted to be retained for the remainder of their useful service life. The symbol designs that are set forth in the “Standard Highway Signs and Markings” book (see Section 1A.11) shall be used. Each pedestrian signal head indication shall be independently displayed and emit a single color.</b></p> <p><b>02 If a two-section pedestrian signal head is used, the UPRAISED HAND (symbolizing DONT WALK) signal section shall be mounted directly above the WALKING PERSON (symbolizing WALK) signal section. If a one-section pedestrian signal head is used, the symbols shall be either overlaid upon each other or arranged side-by-side with the UPRAISED HAND symbol to the left of the WALKING PERSON symbol, and a light source that can display each symbol independently shall be used.</b></p> <p><b>03 The WALKING PERSON (symbolizing WALK) signal indication shall be white, conforming to the publication entitled “Pedestrian Traffic Control Signal Indications” (see Section 1A.11), with all except the symbol obscured by an opaque material.</b></p> <p><b>04 The UPRAISED HAND (symbolizing DONT WALK) signal indication shall be</b></p>	<p>4E.4 Size, Design, and Illumination of Pedestrian Signal Head Indications</p> <p>STANDARD</p> <p>All new pedestrian signal head indications shall be displayed within a rectangular background and shall consist of symbolized messages (see Figure 4E-1), except that existing pedestrian signal head indications with lettered or outline style symbol messages shall be permitted to be retained for the remainder of their useful service life. The symbol designs that are set forth in the <b>Federal</b> “Standard Highway Signs and Markings” book shall be used.</p> <p>Each pedestrian signal head indication shall be independently displayed and emit a single color.</p> <p>If a two-section pedestrian signal had is used, the UPRAISED HAND (symbolizing DONT WALK) signal section shall be mounted directly above the WALKING PERSON (symbolizing WALK) signal section. If a one-section pedestrian signal head is used, the symbols shall be either overlaid upon each other or arranged side-by-side with the UPRAISED HAND symbol to the left of the WALKING PERSON symbol, and a light source that can display each symbol independently shall be used.</p> <p>The WALKING PERSON (symbolizing WALK) signal indication shall be white, conforming to the publication entitled “Pedestrian Traffic Control Signal Indications” (see Section 1A.11), with all except the symbol obscured by an opaque material.</p> <p>The UPRAISED HAND (symbolizing DONT</p>	
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<p>orange, conforming to the publication entitled “Pedestrian Traffic Control Signal Indications” (see Section 1A.11), with all except the symbol obscured by an opaque material. When not illuminated, the WALKING PERSON (symbolizing WALK) and UPRaised HAND (symbolizing DONT WALK) symbols shall not be readily visible to pedestrians at the far end of the crosswalk that the pedestrian signal head indications control. For pedestrian signal head indications, the symbols shall be at least 150 mm (6 in) high. The light source of a flashing UPRaised HAND (symbolizing DONT WALK) signal indication shall be flashed continuously at a rate of not less than 50 nor more than 60 times per minute. The <del>illuminated</del> <del>displayed</del> period of each flash shall be <del>not less than half a</del> <del>minimum of 1/2</del> and <del>not more than two thirds a</del> <del>maximum of 2/3</del> of the total flash cycle.</p> <p><b>GUIDANCE</b> Pedestrian signal head indications should be conspicuous and recognizable to pedestrians at all distances from the beginning of the controlled crosswalk to a point 3 m (10 ft) from the end of the controlled crosswalk during both day and night. For crosswalks where the pedestrian enters the crosswalk more than 30 m (100 ft) from the pedestrian signal head indications, the symbols should be at least 225 mm (9 in) high. <i>If the pedestrian signal indication is so bright that it causes excessive glare in nighttime conditions, some form of automatic dimming should be used to reduce the brilliance of the signal indication.</i></p>	<p><b>Portland orange, conforming to the publication entitled “Pedestrian Traffic Control Signal Indications” (see Section 1A.11), with all except the symbol obscured by an opaque material.</b></p> <p><b>05 When not illuminated, the WALKING PERSON (symbolizing WALK) and UPRaised HAND (symbolizing DONT WALK) symbols shall not be readily visible to pedestrians at the far end of the crosswalk that the pedestrian signal head indications control.</b></p> <p><b>06 For pedestrian signal head indications, the symbols shall be at least 6 inches high.</b></p> <p><b>07 The light source of a flashing UPRaised HAND (symbolizing DONT WALK) signal indication shall be flashed continuously at a rate of not less than 50 or more than 60 times per minute. The displayed period of each flash shall be a minimum of 1/2 and a maximum of 2/3 of the total flash cycle.</b></p> <p><i>Guidance:</i></p> <p><i>08 Pedestrian signal head indications should be conspicuous and recognizable to pedestrians at all distances from the beginning of the controlled crosswalk to a point 10 feet from the end of the controlled crosswalk during both day and night.</i></p> <p><i>09 For crosswalks where the pedestrian enters the crosswalk more than 100 feet from the pedestrian signal head indications, the symbols should be at least 9 inches high.</i></p> <p><i>10 If the pedestrian signal indication is so bright that it causes excessive glare in nighttime conditions, some form of automatic dimming should be used to reduce the brilliance of the signal indication.</i></p> <p><b>Option:</b></p> <p><b>11 An animated eyes symbol may be added to a</b></p>	<p>WALK) signal indication shall be Portland orange, conforming to the publication entitled “Pedestrian Traffic Control Signal Indications” (see Section 1A.11), with all except the symbol obscured by an opaque material. When not illuminated, the WALKING PERSON (symbolizing WALK) and UPRaised HAND (symbolizing DONT WALK) symbols shall not be readily visible to pedestrians at the far end of the crosswalk that the pedestrian signal head indications control. For pedestrian signal head indications, the symbols shall be at least 150 mm (6 in) high. The light source of a flashing UPRaised HAND (symbolizing DONT WALK) signal indication shall be flashed continuously at a rate of not less than 50 nor more than 60 times per minute. The displayed period of each flash shall be a minimum of 1/2 and a maximum of 2/3 of the total flash cycle.</p> <p><b>GUIDANCE</b> Pedestrian signal head indications should be conspicuous and recognizable to pedestrians at all distances from the beginning of the controlled crosswalk to a point 3 m (10 ft) from the end of the controlled crosswalk during both day and night. For crosswalks where the pedestrian enters the crosswalk more than 30 m (100 ft) from the pedestrian signal head indications, the symbols should be at least 225 mm (9 in) high. If the pedestrian signal indication is so bright that it causes excessive glare in nighttime conditions, some form of automatic dimming should be used to reduce the brilliance of the signal indication.</p>	<p>No change</p>
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<p>4E.5 Location and Height of Pedestrian Signal Heads</p> <p>STANDARD</p> <p>Pedestrian signal heads shall be mounted with the bottom of the signal housing including brackets not less than 2.1 m (7 ft) nor more than 3 m (10 ft) above sidewalk level, and shall be positioned and adjusted to provide maximum visibility at the beginning of the controlled crosswalk.</p> <p>If pedestrian signal heads are mounted on the same support as vehicular signal heads, there shall be a physical separation between them.</p> <p>4E.10 6 Pedestrian Intervals and Signal Phases</p>	<p>pedestrian signal head in order to prompt pedestrians to look for vehicles in the intersection during the time that the WALKING PERSON (symbolizing WALK) signal indication is displayed.</p> <p><b>Standard:</b></p> <p><b><sup>12</sup> If used, the animated eyes symbol shall consist of an outline of a pair of white steadily-illuminated eyes with white eyeballs that scan from side to side at a rate of approximately once per second. The animated eyes symbol shall be at least 12 inches wide with each eye having a width of at least 5 inches and a height of at least 2.5 inches. The animated eyes symbol shall be illuminated at the start of the walk interval and shall terminate at the end of the walk interval.</b></p> <p><b>Section 4E.05 Location and Height of Pedestrian Signal Heads</b></p> <p><b>Standard:</b></p> <p><b><sup>01</sup> Pedestrian signal heads shall be mounted with the bottom of the signal housing including brackets not less than 7 feet or more than 10 feet above sidewalk level, and shall be positioned and adjusted to provide maximum visibility at the beginning of the controlled crosswalk.</b></p> <p><b><sup>02</sup> If pedestrian signal heads are mounted on the same support as vehicular signal heads, there shall be a physical separation between them.</b></p> <p><b>Section 4E.06 Pedestrian Intervals and Signal Phases</b></p>	<p>4E.5 Location and Height of Pedestrian Signal Heads</p> <p>STANDARD</p> <p>Pedestrian signal heads shall be mounted with the bottom of the signal housing including brackets not less than 2.1 m (7 ft) nor more than 3 m (10 ft) above sidewalk level, and shall be positioned and adjusted to provide maximum visibility at the beginning of the controlled crosswalk.</p> <p>If pedestrian signal heads are mounted on the same support as vehicular signal heads, there shall be a physical separation between them.</p>	<p>Old 4E.6 moved to 4E.9 – 4E.13</p> <p>Recommend changing per federal manual</p>
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<p><b>STANDARD</b></p> <p>At intersections equipped with pedestrian signal heads, the pedestrian signal indications shall be displayed except when the vehicular traffic control signal is being operated in the flashing mode. At those times, the pedestrian signal <del>lenses</del> indications shall not be <del>illuminated</del> displayed.</p> <p>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.</p> <p>When pedestrian signal heads are used, a WALKING PERSON (symbolizing WALK) signal indication shall be displayed only when pedestrians are permitted to leave the curb or shoulder.</p> <p>A pedestrian <del>clearance time</del> change interval consisting of a flashing UPRAISED HAND (symbolizing DON'T WALK) signal indication shall begin immediately following the WALKING PERSON (symbolizing WALK) signal indication. <del>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 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</del></p>	<p><b>Standard:</b></p> <p>01 <b>At intersections equipped with pedestrian signal heads, the pedestrian signal indications shall be displayed except when the vehicular traffic control signal is being operated in the flashing mode. At those times, the pedestrian signal indications shall not be displayed.</b></p> <p>02 <b>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.</b></p> <p>03 <b>When pedestrian signal heads are used, a WALKING PERSON (symbolizing WALK) signal indication shall be displayed only when pedestrians are permitted to leave the curb or shoulder.</b></p> <p>04 <b>A pedestrian change interval consisting of a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication shall begin immediately following the WALKING PERSON (symbolizing WALK) signal indication. Following the pedestrian change interval, a buffer interval consisting of a steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed for at least 3 seconds prior to the 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 (see Paragraphs 7</b></p>	<p>4E.6 Pedestrian Intervals and Signal Phases</p> <p><b>STANDARD</b></p> <p>At intersections equipped with pedestrian signal heads, the pedestrian signal indications shall be displayed except when the vehicular traffic control signal is being operated in the flashing mode. At those times, the pedestrian signal indications shall not be displayed.</p> <p>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.</p> <p>When pedestrian signal heads are used, a WALKING PERSON (symbolizing WALK) signal indication shall be displayed only when pedestrians are permitted to leave the curb or shoulder.</p> <p>A pedestrian change interval consisting of a flashing UPRAISED HAND (symbolizing DON'T WALK) signal indication shall begin immediately following the WALKING PERSON (symbolizing WALK) signal indication.</p> <p>Following the pedestrian change interval, a buffer interval consisting of a steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed for at least 3 seconds prior to the release of any</p>	<p>Remove paragraph reference</p>
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<p><del>displayed.</del> Following the pedestrian change interval, a buffer interval consisting of a steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed for at least 3 seconds prior to the 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 <del>(see Paragraphs 7 through 16)</del><b>(see below)</b>. The buffer interval shall not begin later than the beginning of the red clearance interval, if used.</p> <p><del>If countdown pedestrian signals are used, a steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed during the yellow change interval and any red clearance interval (prior to a conflicting green being displayed) (see Section 4E.07).</del></p> <p><b>OPTION</b> <del>The pedestrian clearance time may be entirely contained within the vehicular green interval, or may be entirely contained within the vehicular green and yellow change intervals.</del> During the yellow change interval, the UPRAISED HAND (symbolizing DON'T WALK) signal indication may be displayed as either a flashing indication, a steady indication, or a flashing indication for an initial portion of the yellow change interval and a steady indication for the remainder of the interval.</p> <p><b>Support:</b> Figure 4E-2 illustrates the pedestrian intervals and their possible relationships with associated vehicular signal phase intervals.</p>	<p><b>through 16). The buffer interval shall not begin later than the beginning of the red clearance interval, if used.</b></p> <p><b>Option:</b> 05 During the yellow change interval, the UPRAISED HAND (symbolizing DON'T WALK) signal indication may be displayed as either a flashing indication, a steady indication, or a flashing indication for an initial portion of the yellow change interval and a steady indication for the remainder of the interval.</p> <p><b>Support:</b> 06 Figure 4E-2 illustrates the pedestrian intervals and their possible relationships with associated vehicular signal phase intervals. <i>Guidance:</i> 07 <i>Except as provided in Paragraph 8, the</i></p>	<p>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 <del>(see Paragraphs 7 through 16)</del><b>(see below)</b>. The buffer interval shall not begin later than the beginning of the red clearance interval, if used.</p> <p><b>OPTION</b> During the yellow change interval, the UPRAISED HAND (symbolizing DON'T WALK) signal indication may be displayed as either a flashing indication, a steady indication, or a flashing indication for an initial portion of the yellow change interval and a steady indication for the remainder of the interval.</p> <p><b>Support:</b> Figure 4E-2 illustrates the pedestrian intervals</p>	
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<p><b>GUIDANCE</b>  Except as provided above, the <del>The</del> pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the curb or shoulder <del>during</del> <b>at the end of</b> the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of <del>1.2 m (4 3.5ft)</del> per second, to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait.</p> <p><b>OPTION</b>  <del>Passive pedestrian detection equipment, which can detect pedestrians who need more time to complete their crossing and can extend the length of the pedestrian clearance time for that particular cycle, may be used in order to avoid using a lower walking speed to determine the pedestrian clearance time.</del>  A walking speed of up to 4 feet per second may be used to evaluate the sufficiency of the pedestrian clearance time at locations where an extended pushbutton press function has been installed to provide slower pedestrians an opportunity to request and receive a longer pedestrian clearance time. Passive pedestrian detection may also be used to automatically adjust the pedestrian clearance time based on the pedestrian’s actual walking speed or actual clearance of the crosswalk.</p> <p>The additional time provided by an extended pushbutton press to satisfy pedestrian clearance time needs may be added to either the walk interval or the pedestrian change interval.</p> <p><b>GUIDANCE</b>  Where pedestrians who walk slower than <del>1.2 m (4 3.5 ft)</del> per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than <del>1.2 m (4 3.5 ft)</del> per</p>	<p><i>pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the curb or shoulder at the end of the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 3.5 feet per second to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait.</i></p> <p><b>Option:</b>  08 A walking speed of up to 4 feet per second may be used to evaluate the sufficiency of the pedestrian clearance time at locations where an extended pushbutton press function has been installed to provide slower pedestrians an opportunity to request and receive a longer pedestrian clearance time. Passive pedestrian detection may also be used to automatically adjust the pedestrian clearance time based on the pedestrian’s actual walking speed or actual clearance of the crosswalk.  09 The additional time provided by an extended pushbutton press to satisfy pedestrian clearance time needs may be added to either the walk interval or the pedestrian change interval.</p> <p><i>Guidance:</i>  10 <i>Where pedestrians who walk slower than 3.5 feet per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 3.5 feet per second should be considered in determining the</i></p>	<p>and their possible relationships with associated vehicular signal phase intervals.</p> <p><b>GUIDANCE</b>  Except as provided above, the pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the curb or shoulder at the end of the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 3.5ft per second, to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait.</p> <p><b>OPTION</b>  A walking speed of up to 4 feet per second may be used to evaluate the sufficiency of the pedestrian clearance time at locations where an extended pushbutton press function has been installed to provide slower pedestrians an opportunity to request and receive a longer pedestrian clearance time. Passive pedestrian detection may also be used to automatically adjust the pedestrian clearance time based on the pedestrian’s actual walking speed or actual clearance of the crosswalk.</p> <p>The additional time provided by an extended pushbutton press to satisfy pedestrian clearance time needs may be added to either the walk interval or the pedestrian change interval.</p> <p><b>GUIDANCE</b>  Where pedestrians who walk slower than 3.5 ft</p>	<p>Remove paragraph reference</p>
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<p>second should be considered in determining the pedestrian clearance time.</p> <p><del>COMPLIANCE DATE: DECEMBER 22, 2008</del></p> <p>Except as <del>noted</del> provided in <del>the Option in Paragraph 12</del> below, the walk interval should be at least 7 seconds in length so that pedestrians will have adequate opportunity to leave the curb or shoulder before the pedestrian clearance time begins.</p> <p>OPTION</p> <p>If pedestrian volumes and characteristics do not require a 7-second walk interval, walk intervals as short as 4 seconds may be used.</p> <p>SUPPORT</p> <p>The walk interval <del>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</del> interval is intended 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.</p> <p>GUIDANCE</p> <p>The total of the walk interval and pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the pedestrian detector (or, if no pedestrian detector is present, a location 6 feet from the face of the curb or from the edge of the pavement) at the beginning of the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 3 feet per second to the far side of the traveled way being crossed or to the median if a two-stage</p>	<p><i>pedestrian clearance time.</i></p> <p><i>11 Except as provided in Paragraph 12, the walk interval should be at least 7 seconds in length so that pedestrians will have adequate opportunity to leave the curb or shoulder before the pedestrian clearance time begins.</i></p> <p>Option:</p> <p>12 If pedestrian volumes and characteristics do not require a 7-second walk interval, walk intervals as short as 4 seconds may be used.</p> <p>Support:</p> <p>13 The walk interval is intended 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.</p> <p><i>Guidance:</i></p> <p><i>14 The total of the walk interval and pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the pedestrian detector (or, if no pedestrian detector is present, a location 6 feet from the face of the curb or from the edge of the pavement) at the beginning of the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 3 feet per second to the far side of the traveled way being crossed or to the median if a two-stage pedestrian crossing sequence is used. Any additional time that is required to</i></p>	<p>per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 3.5 ft per second should be considered in determining the pedestrian clearance time.</p> <p>Except as provided in <b>below</b>, the walk interval should be at least 7 seconds in length so that pedestrians will have adequate opportunity to leave the curb or shoulder before the pedestrian clearance time begins.</p> <p>OPTION</p> <p>If pedestrian volumes and characteristics do not require a 7-second walk interval, walk intervals as short as 4 seconds may be used.</p> <p>SUPPORT</p> <p>The walk interval is intended 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.</p> <p>GUIDANCE</p> <p>The total of the walk interval and pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the pedestrian detector (or, if no pedestrian detector is present, a location 6 feet from the face of the curb or from the edge of the pavement) at the beginning of the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 3 feet</p>	<p>NOTE NEW CROSSING TIME</p> <p>Sign now needs to be installed</p>
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<p>pedestrian crossing sequence is used. Any additional time that is required to satisfy the conditions of this paragraph should be added to the walk interval.</p> <p>OPTION: On a street with a median of sufficient width for pedestrians to wait, a pedestrian clearance time that allows the pedestrian to cross only from the curb or shoulder to the median may be provided.</p> <p>Standard: Where the pedestrian clearance time is sufficient only for crossing from the curb or shoulder to a median of sufficient width for pedestrians to wait, <del>additional measures should be considered, such as</del> median-mounted pedestrian signals (with pedestrian detectors if actuated operation is used) shall be provided (see Sections 4E.8 and 4E.9) and <del>or additional</del> signing such as the R10-3d sign (see Section 2B.52) shall be provided to notify pedestrians to cross only to the median to await the next WALKING PERSON (symbolizing WALK) signal indication.</p> <p>Guidance: Where median-mounted pedestrian signals and detectors are provided, the use of accessible pedestrian signals (see Sections 4E.09 through 4E.13) should be considered.</p> <p>OPTION: During the transition into preemption, the walk interval and the pedestrian change interval may be shortened or omitted as described in Section 4D.1327.</p> <p>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</p>	<p>satisfy the conditions of this paragraph should be added to the walk interval.</p> <p>Option: 15 On a street with a median of sufficient width for pedestrians to wait, a pedestrian clearance time that allows the pedestrian to cross only from the curb or shoulder to the median may be provided.</p> <p>Standard: 16 <b>Where the pedestrian clearance time is sufficient only for crossing from the curb or shoulder to a median of sufficient width for pedestrians to wait, median-mounted pedestrian signals (with pedestrian detectors if actuated operation is used) shall be provided (see Sections 4E.08 and 4E.09) and signing such as the R10-3d sign (see Section 2B.52) shall be provided to notify pedestrians to cross only to the median to await the next WALKING PERSON (symbolizing WALK) signal indication.</b></p> <p>Guidance: 17 <i>Where median-mounted pedestrian signals and detectors are provided, the use of accessible pedestrian signals (see Sections 4E.09 through 4E.13) should be considered.</i></p> <p>Option: 18 During the transition into preemption, the walk interval and the pedestrian change interval may be shortened or omitted as described in Section 4D.27.</p> <p>19 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</p>	<p>per second to the far side of the traveled way being crossed or to the median if a two-stage pedestrian crossing sequence is used. Any additional time that is required to satisfy the conditions of this paragraph should be added to the walk interval.</p> <p>OPTION: On a street with a median of sufficient width for pedestrians to wait, a pedestrian clearance time that allows the pedestrian to cross only from the curb or shoulder to the median may be provided.</p> <p>Standard: Where the pedestrian clearance time is sufficient only for crossing from the curb or shoulder to a median of sufficient width for pedestrians to wait median-mounted pedestrian signals (with pedestrian detectors if actuated operation is used) shall be provided (see Sections 4E.8 and 4E.9) and signing such as the R10-3d sign (see Section 2B.52) shall be provided to notify pedestrians to cross only to the median to await the next WALKING PERSON (symbolizing WALK) signal indication.</p> <p>Guidance: Where median-mounted pedestrian signals and detectors are provided, the use of accessible pedestrian signals (see Sections 4E.09 through 4E.13) should be considered.</p> <p>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.</p> <p>At intersections with high pedestrian volumes and high conflicting turning vehicle volumes, a brief leading pedestrian interval, during which an advance WALKING PERSON</p>	
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<p>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.</p> <p><b>Guidance:</b> If a leading pedestrian interval is used, the use of accessible pedestrian signals (see Sections 4E.09 through 4E.13) should be considered.</p> <p><b>Support:</b> If a leading pedestrian interval is used without accessible features, pedestrians who are visually impaired can be expected to begin crossing at the onset of the vehicular movement when drivers are not expecting them to begin crossing.</p> <p><b>Guidance:</b> If a leading pedestrian interval is used, it should be at least 3 seconds in duration and should be timed to allow pedestrians to cross at least one lane of traffic or, in the case of a large corner radius, to travel far enough for pedestrians to establish their position ahead of the turning traffic before the turning traffic is released.</p> <p>If a leading pedestrian interval is used, consideration should be given to prohibiting turns across the crosswalk during the leading pedestrian interval.</p> <p><b>Support:</b> 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 is sometimes</p>	<p>reduce conflicts between pedestrians and turning vehicles.</p> <p><b>Guidance:</b> <i>20 If a leading pedestrian interval is used, the use of accessible pedestrian signals (see Sections 4E.09 through 4E.13) should be considered.</i></p> <p><b>Support:</b> 21 If a leading pedestrian interval is used without accessible features, pedestrians who are visually impaired can be expected to begin crossing at the onset of the vehicular movement when drivers are not expecting them to begin crossing.</p> <p><b>Guidance:</b> <i>22 If a leading pedestrian interval is used, it should be at least 3 seconds in duration and should be timed to allow pedestrians to cross at least one lane of traffic or, in the case of a large corner radius, to travel far enough for pedestrians to establish their position ahead of the turning traffic before the turning traffic is released.</i></p> <p><i>23 If a leading pedestrian interval is used, consideration should be given to prohibiting turns across the crosswalk during the leading pedestrian interval.</i></p> <p><b>Support:</b> 24 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 is sometimes intentionally set to extend beyond the pedestrian clearance time to provide turning drivers additional green time to make their turns while the pedestrian signal head is</p>	<p>(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.</p> <p><b>Guidance:</b> If a leading pedestrian interval is used, the use of accessible pedestrian signals (see Sections 4E.09 through 4E.13) should be considered.</p> <p><b>Support:</b> If a leading pedestrian interval is used without accessible features, pedestrians who are visually impaired can be expected to begin crossing at the onset of the vehicular movement when drivers are not expecting them to begin crossing.</p> <p><b>Guidance:</b> If a leading pedestrian interval is used, it should be at least 3 seconds in duration and should be timed to allow pedestrians to cross at least one lane of traffic or, in the case of a large corner radius, to travel far enough for pedestrians to establish their position ahead of the turning traffic before the turning traffic is released.</p> <p>If a leading pedestrian interval is used, consideration should be given to prohibiting turns across the crosswalk during the leading pedestrian interval.</p> <p><b>Support:</b> At intersections with pedestrian volumes that are so high that drivers have difficulty finding</p>	<p>Recommend changes with notes below</p>
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<p>intentionally set to extend beyond 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.</p> <p>4E.07 Countdown Pedestrian Signals</p> <p><del>OPTION</del> STANDARD All pedestrian signal heads used at crosswalks where the pedestrian change interval is more than 7 seconds shall include a <del>A</del> pedestrian change interval countdown display <del>may be added to a pedestrian signal head</del> in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval. Option: Pedestrian signal heads used at crosswalks where the pedestrian change interval is 7 seconds or less may include a pedestrian change interval countdown display in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval. STANDARD Where countdown pedestrian signals are used, the countdown shall always be displayed simultaneously with the flashing UPRAISED HAND (symbolizing DONT WALK) signal indication displayed for that crosswalk.</p> <p><del>If used,</del> eCountdown pedestrian signals shall consist of Portland orange numbers that are at least 150 mm (6 in) in height on a black opaque background. The countdown pedestrian</p>	<p>displaying a steady UPRAISED HAND (symbolizing DONT WALK) signal indication after pedestrians have had time to complete their crossings.</p> <p><b>Section 4E.07 Countdown Pedestrian Signals</b> <b>Standard:</b> 01 <b>All pedestrian signal heads used at crosswalks where the pedestrian change interval is more than 7 seconds shall include a pedestrian change interval countdown display in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval.</b> Option: 02 Pedestrian signal heads used at crosswalks where the pedestrian change interval is 7 seconds or less may include a pedestrian change interval countdown display in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval. <b>Standard:</b> 03 <b>Where countdown pedestrian signals are used, the countdown shall always be displayed simultaneously with the flashing UPRAISED HAND (symbolizing DONT WALK) signal indication displayed for that crosswalk.</b></p> <p>04 <b>Countdown pedestrian signals shall consist of Portland orange numbers that are at least 6 inches in height on a black opaque background. The countdown pedestrian signal shall be located immediately</b></p>	<p>an opportunity to turn across the crosswalk, the duration of the green interval for a parallel concurrent vehicular movement is sometimes intentionally set to extend beyond 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.</p> <p>4E.07 Countdown Pedestrian Signals STANDARD All pedestrian signal heads used at crosswalks where the pedestrian change interval is more than 7 seconds shall include a pedestrian change interval countdown display in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval. Option: Pedestrian signal heads used at crosswalks where the pedestrian change interval is 7 seconds or less may include a pedestrian change interval countdown display in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval. STANDARD Where countdown pedestrian signals are used, the countdown shall always be displayed simultaneously with the flashing UPRAISED HAND (symbolizing DONT WALK) signal indication displayed for that crosswalk.</p> <p>Countdown pedestrian signals shall consist of Portland orange numbers that are at least 150</p>	
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<p>signal shall be located immediately adjacent to the associated UPRAISED HAND (symbolizing DONT WALK) pedestrian signal head indication (see Figure 4E-1).</p> <p><del>If used,</del>† The display of the number of remaining seconds shall begin only at the beginning of the pedestrian change interval (flashing UPRAISED HAND). After the countdown displays zero, the display shall remain dark until the beginning of the next countdown.</p> <p><del>If used,</del>† 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 <del>yellow change red clearance</del> interval of a concurrent vehicular phase.</p> <p>GUIDANCE</p> <p>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 <del>crossing- clearance</del> time (see Section 4E.106) 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.</p> <p><del>In this case, the countdown 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 steady UPRAISED HAND, and should be dark during the additional clearance interval prior to the conflicting vehicular phase.</del></p> <p>For crosswalks where the pedestrian enters the</p>	<p><b>adjacent to the associated UPRAISED HAND (symbolizing DONT WALK) pedestrian signal head indication (see Figure 4E-1).</b></p> <p><b>05 The display of the number of remaining seconds shall begin only at the beginning of the pedestrian change interval (flashing UPRAISED HAND). After the countdown displays zero, the display shall remain dark until the beginning of the next countdown.</b></p> <p><b>06 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 red clearance interval of a concurrent vehicular phase.</b></p> <p><i>Guidance:</i></p> <p><i>07 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 clearance time (see Section 4E.06) 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.</i></p> <p><i>08 For crosswalks where the pedestrian enters the crosswalk more than 100 feet from the</i></p>	<p>mm (6 in) in height on a black opaque background. The countdown pedestrian signal shall be located immediately adjacent to the associated UPRAISED HAND (symbolizing DONT WALK) pedestrian signal head indication (see Figure 4E-1).</p> <p>The display of the number of remaining seconds shall begin only at the beginning of the pedestrian change interval (flashing UPRAISED HAND). After the countdown displays zero, the display shall remain dark until the beginning of the next countdown. 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 red clearance interval of a concurrent vehicular phase.</p> <p>GUIDANCE</p> <p>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 clearance time (see Section 4E.6) 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.</p>	<p>***NOTE***</p> <p>Language was taken out of previous Mn manual. Committee recommends adding back in now that countdown ped signals must be installed</p> <p>Recommend removing Mn language</p>
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<p>crosswalk more than 30 m (100 ft) from the countdown pedestrian signal display, the numbers should be at least 225 mm (9 in) in height.</p> <p>Because some technology includes the countdown pedestrian signal logic in a separate timing device that is independent of the timing in the traffic signal controller, care should be exercised by the engineer when timing changes are made to pedestrian change intervals.</p> <p>If the pedestrian change interval is interrupted or shortened as a part of a transition into a preemption sequence (see Section 4E.06), the countdown pedestrian signal display should be discontinued and go dark immediately upon activation of the preemption transition.</p> <p><b>STANDARD</b>  <del>At a pedestrian crossing where a countdown pedestrian signal is used, the pedestrian change interval timing shall not be altered or omitted as part of a transition into a preemption sequence.</del></p> <p><del>Operational Requirements —  — COMPLIANCE DATE: DECEMBER 22, 2006</del></p> <p><del>Hardware Requirements  — COMPLIANCE DATE: DECEMBER 22, 2013</del></p> <p>Section 4E.08 Pedestrian Detectors</p> <p>Option:  Pedestrian detectors may be pushbuttons or passive detection devices.</p> <p>Support:  Passive detection devices register the presence</p>	<p><i>countdown pedestrian signal display, the numbers should be at least 9 inches in height.</i></p> <p><i>09 Because some technology includes the countdown pedestrian signal logic in a separate timing device that is independent of the timing in the traffic signal controller, care should be exercised by the engineer when timing changes are made to pedestrian change intervals.</i></p> <p><i>10 If the pedestrian change interval is interrupted or shortened as a part of a transition into a preemption sequence (see Section 4E.06), the countdown pedestrian signal display should be discontinued and go dark immediately upon activation of the preemption transition.</i></p> <p><b>Section 4E.08 Pedestrian Detectors</b></p> <p>Option:  01 Pedestrian detectors may be pushbuttons or passive detection devices.</p> <p>Support:  02 Passive detection devices register the presence of a pedestrian in a position indicative of a desire to cross, without requiring the pedestrian to push a button. Some passive</p>	<p>For crosswalks where the pedestrian enters the crosswalk more than 30 m (100 ft) from the countdown pedestrian signal display, the numbers should be at least 225 mm (9 in) in height.</p> <p>Because some technology includes the countdown pedestrian signal logic in a separate timing device that is independent of the timing in the traffic signal controller, care should be exercised by the engineer when timing changes are made to pedestrian change intervals.</p> <p>If the pedestrian change interval is interrupted or shortened as a part of a transition into a preemption sequence (see Section 4E.06), the countdown pedestrian signal display should be discontinued and go dark immediately upon activation of the preemption transition.</p> <p>Section 4E.08 Pedestrian Detectors</p> <p>Option:  Pedestrian detectors may be pushbuttons or passive detection devices.</p>	<p>Compliance date?</p> <p>Recommend changes with notes below</p> <p>Remove paragraph language</p>
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<p>of a pedestrian in a position indicative of a desire to cross, without requiring the pedestrian to push a button. Some passive detection devices are capable of tracking the progress of a pedestrian as the pedestrian crosses the roadway for the purpose of extending or shortening the duration of certain pedestrian timing intervals.</p> <p>The provisions in this Section place pedestrian pushbuttons within easy reach of pedestrians who are intending to cross each crosswalk and make it obvious which pushbutton is associated with each crosswalk. These provisions also position pushbutton poles in optimal locations for installation of accessible pedestrian signals (see Sections 4E.09 through 4E.13). Information regarding reach ranges can be found in the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).</p> <p><b>GUIDANCE</b>  <del>When</del> If pedestrian <del>actuation</del> pushbuttons <del>is</del> are used, <del>pedestrian pushbutton detectors</del> they should be capable of easy activation and conveniently located near each end of the crosswalks. <del>Except as provided in Paragraphs 5 and 6</del> <b>below</b>, pedestrian pushbuttons should be located to meet all of the following criteria (see Figure 4E-3)</p> <p>A. Unobstructed and adjacent to a level all-weather surface to provide access from a wheelchair;  B. Where there is an all-weather surface, a wheelchair accessible route from the pushbutton to the ramp;  C. Between the edge of the crosswalk line (extended) farthest from the center of the</p>	<p>detection devices are capable of tracking the progress of a pedestrian as the pedestrian crosses the roadway for the purpose of extending or shortening the duration of certain pedestrian timing intervals.</p> <p>03 The provisions in this Section place pedestrian pushbuttons within easy reach of pedestrians who are intending to cross each crosswalk and make it obvious which pushbutton is associated with each crosswalk. These provisions also position pushbutton poles in optimal locations for installation of accessible pedestrian signals (see Sections 4E.09 through 4E.13). Information regarding reach ranges can be found in the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).</p> <p><i>Guidance:</i>  04 <i>If pedestrian pushbuttons are used, they should be capable of easy activation and conveniently located near each end of the crosswalks. Except as provided in Paragraphs 5 and 6, pedestrian pushbuttons should be located to meet all of the following criteria (see Figure 4E-3):</i></p> <p>A. <i>Unobstructed and adjacent to a level all-weather surface to provide access from a wheelchair;</i>  B. <i>Where there is an all-weather surface, a wheelchair accessible route from the pushbutton to the ramp;</i>  C. <i>Between the edge of the crosswalk line (extended) farthest from the center of the intersection and the side of a curb ramp (if present), but not greater than 5 feet from said crosswalk line;</i>  D. <i>Between 1.5 and 6 feet from the edge of the</i></p>	<p>Support:  Passive detection devices register the presence of a pedestrian in a position indicative of a desire to cross, without requiring the pedestrian to push a button. Some passive detection devices are capable of tracking the progress of a pedestrian as the pedestrian crosses the roadway for the purpose of extending or shortening the duration of certain pedestrian timing intervals.</p> <p>The provisions in this Section place pedestrian pushbuttons within easy reach of pedestrians who are intending to cross each crosswalk and make it obvious which pushbutton is associated with each crosswalk. These provisions also position pushbutton poles in optimal locations for installation of accessible pedestrian signals (see Sections 4E.09 through 4E.13). Information regarding reach ranges can be found in the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).</p> <p><b>GUIDANCE</b>  If pedestrian pushbuttons are used, they should be capable of easy activation and conveniently located near each end of the crosswalks. Except as provided in Paragraphs 5 and 6 <b>below</b>, pedestrian pushbuttons should be located to meet all of the following criteria (see Figure 4E-3)</p> <p>A. Unobstructed and adjacent to a level all-weather surface to provide access from a wheelchair;  B. Where there is an all-weather surface, a wheelchair accessible route from the pushbutton to the ramp;  C. Between the edge of the crosswalk line</p>	<p>Recommend removing figures related to pushbutton locations</p> <p>Would like to remove the word physical. There are at times constraints such as an area that is continuously being hit by vehicles that make a location impractical</p>
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<p>intersection and the side of a curb ramp (if present), but not greater than 5 feet from said crosswalk line;</p> <p>D. Between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement;</p> <p>E. With the face of the pushbutton parallel to the crosswalk to be used; and</p> <p>F. At a mounting height of approximately 3.5 feet, but no more than 4 feet, above the sidewalk.</p> <p>Where there are <del>physical</del> 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.</p> <p>Where there are <del>physical</del> constraints that make it impractical to place the pedestrian pushbutton between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement, it should not be farther than 10 feet from the edge of curb, shoulder, or pavement.</p> <p><del>A mounting height of approximately 1.1 m (3.5 ft) above the sidewalk should be used for pedestrian pushbutton detectors.</del></p> <p>Except as provided in Paragraph 8, <b>below</b>, where two pedestrian pushbuttons are provided on the same corner of a signalized location, the pushbuttons should be separated by a distance of at least 10 feet.</p> <p>OPTION: Where there are <del>physical</del> constraints on a particular corner that make it impractical to provide the 10-foot separation between the two pedestrian pushbuttons, the pushbuttons may be placed closer together or on the same pole</p> <p><b>Support:</b></p>	<p><i>curb, shoulder, or pavement;</i></p> <p><i>E. With the face of the pushbutton parallel to the crosswalk to be used; and</i></p> <p><i>F. At a mounting height of approximately 3.5 feet, but no more than 4 feet, above the sidewalk.</i></p> <p>05 <i>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.</i></p> <p>06 <i>Where there are physical constraints that make it impractical to place the pedestrian pushbutton between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement, it should not be farther than 10 feet from the edge of curb, shoulder, or pavement.</i></p> <p>07 <i>Except as provided in Paragraph 8, where two pedestrian pushbuttons are provided on the same corner of a signalized location, the pushbuttons should be separated by a distance of at least 10 feet.</i></p> <p>Option: 08 Where there are physical constraints on a particular corner that make it impractical to provide the 10-foot separation between the two pedestrian pushbuttons, the pushbuttons may be placed closer together or on the same pole.</p> <p><b>Support:</b> 09 Figure 4E-4 shows typical pedestrian</p>	<p>(extended) farthest from the center of the intersection and the side of a curb ramp (if present), but not greater than 5 feet from said crosswalk line;</p> <p>D. Between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement;</p> <p>E. With the face of the pushbutton parallel to the crosswalk to be used; and</p> <p>F. At a mounting height of approximately 3.5 feet, but no more than 4 feet, above the sidewalk.</p> <p>Where there are <del>physical</del> 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.</p> <p>Where there are constraints that make it impractical to place the pedestrian pushbutton between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement, it should not be farther than 10 feet from the edge of curb, shoulder, or pavement.</p> <p>Except as provided in Paragraph 8, <b>below</b>, where two pedestrian pushbuttons are provided on the same corner of a signalized location, the pushbuttons should be separated by a distance of at least 10 feet.</p> <p>OPTION:</p>	<p>Remove paragraph reference</p>
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Figure 4E-4 shows typical pedestrian pushbutton locations for a variety of situations.

**STANDARD**

Signs (see Section 2B.4452) shall be mounted adjacent to or integral with pedestrian pushbuttons ~~detectors~~, explaining their purpose and use.

**OPTION**

At certain locations, a supplemental sign in a more visible location may be used to call attention to the pedestrian ~~detector~~ pushbutton.

**GUIDANCE STANDARD**

~~If two crosswalks, oriented in different directions, end at or near the same location, the~~

The positioning of pedestrian ~~detectors~~ pushbuttons and/or the legends on the pedestrian ~~detector~~ pushbutton signs ~~should~~ shall clearly indicate which crosswalk signal is actuated by each pedestrian ~~detector~~ pushbutton.

**STANDARD**

If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and the signals are pedestrian actuated, an additional pedestrian detector shall be provided in the median.

**GUIDANCE**

The use of additional pedestrian detectors on islands or medians where a pedestrian might become stranded should be considered.

If used, special purpose pushbuttons (to be operated only by authorized persons) should include a housing capable of being locked to prevent access by the general public. ~~If special purpose pushbuttons are used, and do not need an instructional signs shall not be required.~~

pushbutton locations for a variety of situations.

**Standard:**

10 **Signs (see Section 2B.52) shall be mounted adjacent to or integral with pedestrian pushbuttons, explaining their purpose and use.**

**Option:**

11 At certain locations, a supplemental sign in a more visible location may be used to call attention to the pedestrian pushbutton.

**Standard:**

12 **The positioning of pedestrian pushbuttons and the legends on the pedestrian pushbutton signs shall clearly indicate which crosswalk signal is actuated by each pedestrian pushbutton.**

13 **If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and the signals are pedestrian actuated, an additional pedestrian detector shall be provided in the median.**

*Guidance:*

14 *The use of additional pedestrian detectors on islands or medians where a pedestrian might become stranded should be considered.*

15 *If used, special purpose pushbuttons (to be operated only by authorized persons) should include a housing capable of being locked to prevent access by the general public and do not need an instructional sign.*

Where there are constraints on a particular corner that make it impractical to provide the 10-foot separation between the two pedestrian pushbuttons, the pushbuttons may be placed closer together or on the same pole

**Support:**

Figure 4E-4 shows typical pedestrian pushbutton locations for a variety of situations.

**STANDARD**

Signs (see Section 2B. 52) shall be mounted adjacent to or integral with pedestrian pushbuttons, explaining their purpose and use.

**OPTION**

At certain locations, a supplemental sign in a more visible location may be used to call attention to the pedestrian pushbutton.

**STANDARD**

The positioning of pedestrian pushbuttons and the legends on the pedestrian pushbutton signs shall clearly indicate which crosswalk signal is actuated by each pedestrian pushbutton.

If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and the signals are pedestrian actuated, an additional pedestrian detector shall be provided in the median.

**GUIDANCE**

The use of additional pedestrian detectors on islands or medians where a pedestrian might become stranded should be considered.

Language not in current MN manual, not shown as new in federal manual

<p>STANDARD</p> <p>If used, a pilot light or other means of indication installed with a pedestrian pushbutton shall not be illuminated until actuation. Once it is actuated, <del>the</del> <b>the pilot light</b> shall remain illuminated until the pedestrian’s green or WALKING PERSON (symbolizing WALK) signal indication is displayed.</p> <p>If a pilot light is used at an accessible pedestrian signal location (see Sections 4E.09 through 4E.13), each actuation shall be accompanied by the speech message “wait.”</p> <p>Option:</p> <p>At signalized locations with a demonstrated need and subject to equipment capabilities, pedestrians with special needs may be provided with additional crossing time by means of an extended pushbutton press.</p> <p>Standard:</p> <p>If additional crossing time is provided by means of an extended pushbutton press, a <b>PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P)</b> plaque (see Figure 2B-26) shall be mounted adjacent to or integral with the pedestrian pushbutton.</p> <p>4E.9 Accessible Pedestrian Signal Detectors</p> <p>SUPPORT</p> <p>Accessible pedestrian signals and detectors provide information in non-visual formats (such as audible tones, <del>verbal</del> <b>speech</b> messages, and/or vibrating surfaces).</p>	<p><b>Standard:</b></p> <p><b>16 If used, a pilot light or other means of indication installed with a pedestrian pushbutton shall not be illuminated until actuation. Once it is actuated, the pilot light shall remain illuminated until the pedestrian’s green or WALKING PERSON (symbolizing WALK) signal indication is displayed.</b></p> <p><b>17 If a pilot light is used at an accessible pedestrian signal location (see Sections 4E.09 through 4E.13), each actuation shall be accompanied by the speech message “wait.”</b></p> <p>Option:</p> <p>18 At signalized locations with a demonstrated need and subject to equipment capabilities, pedestrians with special needs may be provided with additional crossing time by means of an extended pushbutton press.</p> <p><b>Standard:</b></p> <p><b>19 If additional crossing time is provided by means of an extended pushbutton press, a PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P) plaque (see Figure 2B-26) shall be mounted adjacent to or integral with the pedestrian pushbutton.</b></p> <p><b>Section 4E.09 Accessible Pedestrian Signals and Detectors – General</b></p> <p>Support:</p> <p>01 Accessible pedestrian signals and detectors provide information in non-visual formats (such as audible tones, speech messages, and/or vibrating surfaces).</p> <p>02 The primary technique that pedestrians who have visual disabilities use to cross streets at</p>	<p>If used, special purpose pushbuttons (to be operated only by authorized persons) should include a housing capable of being locked to prevent access by the general public and do not need an instructional sign.</p> <p>STANDARD</p> <p>If used, a pilot light or other means of indication installed with a pedestrian pushbutton shall not be illuminated until actuation. Once it is actuated, the pilot light shall remain illuminated until the pedestrian’s green or WALKING PERSON (symbolizing WALK) signal indication is displayed.</p> <p>If a pilot light is used at an accessible pedestrian signal location (see Sections 4E.09 through 4E.13), each actuation shall be accompanied by the speech message “wait.”</p> <p>Option:</p> <p>At signalized locations with a demonstrated need and subject to equipment capabilities, pedestrians with special needs may be provided with additional crossing time by means of an extended pushbutton press.</p> <p>Standard:</p> <p>If additional crossing time is provided by means of an extended pushbutton press, a <b>PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P)</b> plaque (see Figure 2B-26) shall be mounted adjacent to or integral with the pedestrian pushbutton.</p> <p>4E.9 Accessible Pedestrian Signal</p>	<p>Includes text from old 4E.6. parts of 4E.6 and 4E.9 relocated in new sections 4E.9-4E.13</p> <p>Recommend changing, see note below</p>
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<p><del>Information regarding detectors for accessible pedestrian signals is found in Section 4E.9.</del> The primary technique that pedestrians who have visual disabilities use to cross streets at signalized locations is to initiate their crossing when they hear the traffic in front of them stop and the traffic alongside them begin to move, <del>corresponding</del> which often corresponds to the onset of the green interval. <del>This technique is effective at many signalized locations.</del> The existing environment is often not sufficient to provide the information that pedestrians who have visual disabilities need to operate reasonably safely cross a roadway at a signalized location. <del>Therefore, many signalized locations will not require any accessible pedestrian signals.</del></p> <p><b>GUIDANCE</b> If a particular signalized location presents difficulties for pedestrians who have visual disabilities to cross reasonably safely and effectively the roadway, an engineering study should be conducted that considers the safety and effectiveness needs of for pedestrians in general, as well as the information needs of pedestrians with visual disabilities. The <del>installation of accessible pedestrian signals at signalized locations should be based on an</del> engineering study, which should consider the following factors:</p> <ul style="list-style-type: none"> <li>A. Potential demand for accessible pedestrian signals;</li> <li>B. A request for accessible pedestrian signals;</li> <li>C. Traffic volumes during times when pedestrians might be present, including periods of low traffic volumes or high turn-on-red volumes;</li> <li>D. The complexity of traffic signal phasing (such as split phases, protected turn phases,</li> </ul>	<p>signalized locations is to initiate their crossing when they hear the traffic in front of them stop and the traffic alongside them begin to move, which often corresponds to the onset of the green interval. The existing environment is often not sufficient to provide the information that pedestrians who have visual disabilities need to cross a roadway at a signalized location.</p> <p><i>Guidance:</i> 03 If a particular signalized location presents difficulties for pedestrians who have visual disabilities to cross the roadway, an engineering study should be conducted that considers the needs of pedestrians in general, as well as the information needs of pedestrians with visual disabilities. The engineering study should consider the following factors:</p> <ul style="list-style-type: none"> <li>A. Potential demand for accessible pedestrian signals;</li> <li>B. A request for accessible pedestrian signals;</li> <li>C. Traffic volumes during times when pedestrians might be present, including periods of low traffic volumes or high turn-on-red volumes;</li> <li>D. The complexity of traffic signal phasing (such as split phases, protected turn phases, leading pedestrian intervals, and exclusive pedestrian phases); and</li> <li>E. The complexity of intersection geometry.</li> </ul>	<p><b>Detectors</b> <b>SUPPORT</b> Accessible pedestrian signals and detectors provide information in non-visual formats (such as audible tones, speech messages, and/or vibrating surfaces). The primary technique that pedestrians who have visual disabilities use to cross streets at signalized locations is to initiate their crossing when they hear the traffic in front of them stop and the traffic alongside them begin to move, which often corresponds to the onset of the green interval. The existing environment is often not sufficient to provide the information that pedestrians who have visual disabilities need to cross a roadway at a signalized location.</p> <p><b>GUIDANCE</b> If a particular signalized location presents difficulties for pedestrians who have visual disabilities to cross the roadway, an engineering study should be conducted that considers the needs of pedestrians in general, as well as the information needs of pedestrians with visual disabilities. The engineering study should consider the following factors:</p> <ul style="list-style-type: none"> <li>A. Potential demand for accessible pedestrian signals;</li> <li>B. A request for accessible pedestrian signals;</li> <li>C. Traffic volumes during times when pedestrians might be present, including periods of low traffic volumes or high turn-on-red volumes;</li> </ul>	
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<p>leading pedestrian intervals, and exclusive pedestrian phases); and</p> <p>E. The complexity of intersection geometry.</p> <p><b>SUPPORT</b></p> <p>The factors that <b>might</b> make crossing at a signalized location difficult for pedestrians who have visual disabilities include: increasingly quiet cars, right turn on red (which masks the beginning of the through phase), continuous right-turn movements, complex signal operations, traffic circles, and wide streets. Further, low traffic volumes might make it difficult for pedestrians who have visual disabilities to discern signal phase changes.</p> <p>Local organizations, providing support services to pedestrians who have visual and/or hearing disabilities, can often act as important advisors to the traffic engineer when consideration is being given to the installation of devices to assist such pedestrians. Additionally, orientation and mobility specialists or similar staff also might be able to provide a wide range of advice. The U.S. Access Board’s <del>Document A-37, “Accessible Pedestrian Signals,”</del> (<a href="http://www.access-board.gov">www.access-board.gov</a>) provides <del>various techniques</del> technical assistance for making pedestrian signal information available to persons with visual disabilities (see Page i for the address for the U.S. Access Board).</p> <p><b>STANDARD</b></p> <p>When used, accessible pedestrian signals shall be used in combination with pedestrian signal timing. The information provided by an accessible pedestrian signal shall clearly indicate which pedestrian crossing is served by each device.</p> <p>Under stop-and-go operation, accessible pedestrian signals shall not be limited in</p>	<p><b>Support:</b></p> <p>04 The factors that make crossing at a signalized location difficult for pedestrians who have visual disabilities include: increasingly quiet cars, right turn on red (which masks the beginning of the through phase), continuous right-turn movements, complex signal operations, traffic circles, and wide streets. Furthermore, low traffic volumes might make it difficult for pedestrians who have visual disabilities to discern signal phase changes.</p> <p>05 Local organizations, providing support services to pedestrians who have visual and/or hearing disabilities, can often act as important advisors to the traffic engineer when consideration is being given to the installation of devices to assist such pedestrians. Additionally, orientation and mobility specialists or similar staff also might be able to provide a wide range of advice. The U.S. Access Board (<a href="http://www.access-board.gov">www.access-board.gov</a>) provides technical assistance for making pedestrian signal information available to persons with visual disabilities (see Page i for the address for the U.S. Access Board).</p> <p><b>Standard:</b></p> <p>06 <b>When used, accessible pedestrian signals shall be used in combination with pedestrian signal timing. The information provided by an accessible pedestrian signal shall clearly indicate which pedestrian crossing is served by each device.</b></p> <p>07 <b>Under stop-and-go operation, accessible pedestrian signals shall not be limited in operation by the time of day or day of week.</b></p>	<p>D. The complexity of traffic signal phasing (such as split phases, protected turn phases, leading pedestrian intervals, and exclusive pedestrian phases); and</p> <p>E. The complexity of intersection geometry.</p> <p><b>SUPPORT</b></p> <p>The factors that make crossing at a signalized location difficult for pedestrians who have visual disabilities include: increasingly quiet cars, right turn on red (which masks the beginning of the through phase), continuous right-turn movements, complex signal operations, traffic circles, and wide streets. Further, low traffic volumes might make it difficult for pedestrians who have visual disabilities to discern signal phase changes.</p> <p>Local organizations, providing support services to pedestrians who have visual and/or hearing disabilities, can often act as important advisors to the traffic engineer when consideration is being given to the installation of devices to assist such pedestrians. Additionally, orientation and mobility specialists or similar staff also might be able to provide a wide range of advice. The U.S. Access Board’s (<a href="http://www.access-board.gov">www.access-board.gov</a>) provides technical assistance for making pedestrian signal information available to persons with visual disabilities (see Page i for the address for the U.S. Access Board).</p> <p><b>STANDARD</b></p> <p>When used, accessible pedestrian signals shall be used in combination with pedestrian signal timing. The information provided by an accessible pedestrian signal shall clearly</p>	<p>***NOTE***</p> <p>Committee recommends removing Mn text to match federal given that these sites are becoming more standard</p>
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<p>operation by the time of day or day of week.  <del>At a pedestrian crossing where accessible pedestrian signals are used, the pedestrian change interval timing shall not be altered or omitted as part of a transition into a preemption sequence.</del></p> <p><b>OPTION</b>  Accessible pedestrian signal detectors may be pushbuttons or passive detection devices.</p> <p>At locations with pretimed traffic control signals or non-actuated approaches, pedestrian pushbuttons may be used to activate the accessible pedestrian signals.</p> <p><b>SUPPORT</b>  Accessible pedestrian signals are typically integrated into the pedestrian detector (pushbutton), so the audible tones and/or messages come from the pushbutton housing. They have a pushbutton locator tone and tactile arrow, and can include audible beaconing and other special features.</p> <p><b>Option:</b>  The name of the street to be crossed may also be provided in accessible format, such as Braille or raised print. Tactile maps of crosswalks may also be provided.</p> <p><b>Support:</b>  Specifications regarding the use of Braille or raised print for traffic control devices can be found in the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).</p> <p><b>STANDARD</b>  At accessible pedestrian signal locations <del>with</del></p>	<p><b>Option:</b>  08 Accessible pedestrian signal detectors may be pushbuttons or passive detection devices.  09 At locations with pretimed traffic control signals or non-actuated approaches, pedestrian pushbuttons may be used to activate the accessible pedestrian signals.</p> <p><b>Support:</b>  10 Accessible pedestrian signals are typically integrated into the pedestrian detector (pushbutton), so the audible tones and/or messages come from the pushbutton housing. They have a pushbutton locator tone and tactile arrow, and can include audible beaconing and other special features.</p> <p><b>Option:</b>  11 The name of the street to be crossed may also be provided in accessible format, such as Braille or raised print. Tactile maps of crosswalks may also be provided.</p> <p><b>Support:</b>  12 Specifications regarding the use of Braille or raised print for traffic control devices can be found in the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).</p> <p><b>Standard:</b>  13 <b>At accessible pedestrian signal locations where pedestrian pushbuttons are used, each pushbutton shall activate both the walk</b></p>	<p>indicate which pedestrian crossing is served by each device.  Under stop-and-go operation, accessible pedestrian signals shall not be limited in operation by the time of day or day of week.</p> <p><b>OPTION</b>  Accessible pedestrian signal detectors may be pushbuttons or passive detection devices.</p> <p>At locations with pretimed traffic control signals or non-actuated approaches, pedestrian pushbuttons may be used to activate the accessible pedestrian signals.</p> <p><b>SUPPORT</b>  Accessible pedestrian signals are typically integrated into the pedestrian detector (pushbutton), so the audible tones and/or messages come from the pushbutton housing. They have a pushbutton locator tone and tactile arrow, and can include audible beaconing and other special features.</p> <p><b>Option:</b>  The name of the street to be crossed may also be provided in accessible format, such as Braille or raised print. Tactile maps of crosswalks may also be provided.</p> <p><b>Support:</b>  Specifications regarding the use of Braille or raised print for traffic control devices can be</p>	<p>Recommend changes</p>
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where pedestrian ~~actuation~~ pushbuttons are used, each pushbutton shall activate both the walk interval and the accessible pedestrian signals.

### Section 4E.10 Accessible Pedestrian Signals and Detectors – Location

**Support:**  
Accessible pedestrian signals that are located as close as possible to pedestrians waiting to cross the street provide the clearest and least ambiguous indication of which pedestrian crossing is served by a device.

**Guidance:**  
Pushbuttons for accessible pedestrian signals should be located in accordance with the provisions of Section 4E.8 and should be located ~~(see Figure 4E-2)~~ as close as possible to the crosswalk line furthest from the center of the intersection and as close as possible to the curb ramp. follows:  
~~A. Adjacent to a level all-weather surface to provide access from a wheelchair, and where there is an all-weather surface, wheelchair accessible route to the ramp;~~  
~~B. Within 1.5 m (5 ft) of the crosswalk extended;~~  
~~C. Within 3 m (10 ft) of the edge of the curb, shoulder, or pavement; and~~  
~~D. Parallel to the crosswalk to be used.~~  
At corners of signalized locations with accessible pedestrian signals where two pedestrian pushbuttons are provided, the pushbuttons should be separated by a distance of at least 3 m (10 ft). This enables pedestrians who have visual disabilities to distinguish and

**interval and the accessible pedestrian signals.**

### Section 4E.10 Accessible Pedestrian Signals and Detectors – Location

**Support:**  
01 Accessible pedestrian signals that are located as close as possible to pedestrians waiting to cross the street provide the clearest and least ambiguous indication of which pedestrian crossing is served by a device.

**Guidance:**  
02 *Pushbuttons for accessible pedestrian signals should be located in accordance with the provisions of Section 4E.08 and should be located as close as possible to the crosswalk line furthest from the center of the intersection and as close as possible to the curb ramp.*

**Standard:**

found in the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11).

**STANDARD**  
At accessible pedestrian signal locations where pedestrian pushbuttons are used, each pushbutton shall activate both the walk interval and the accessible pedestrian signals.

### Section 4E.10 Accessible Pedestrian Signals and Detectors – Location

**Support:**  
Accessible pedestrian signals that are located as close as possible to pedestrians waiting to cross the street provide the clearest and least ambiguous indication of which pedestrian crossing is served by a device.

**Guidance:**  
Pushbuttons for accessible pedestrian signals should be located in accordance with the provisions of Section 4E.8 and should be located as close as possible to the crosswalk line furthest from the center of the intersection and as close as possible to the curb ramp.

<p><del>locate the appropriate pushbutton.</del></p> <p>Standard: If two accessible pedestrian pushbuttons are placed less than 10 feet apart or on the same pole, each accessible pedestrian pushbutton shall be provided with the following features (see Sections 4E.11 through 4E.13):</p> <p>A. A pushbutton locator tone, B. A tactile arrow, C. A speech walk message for the WALKING PERSON (symbolizing WALK) indication, and D. A speech pushbutton information message.</p> <p>If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and accessible pedestrian detectors are used, an additional accessible pedestrian detector <del>should</del> shall be provided in the median.</p> <p><b>Section 4E.11 Accessible Pedestrian Signals and Detectors – Walk Indications</b></p> <p>Support: Technology that provides different sounds for each non-concurrent signal phase has frequently been found to provide ambiguous information. Research indicates that a rapid tick tone for each crossing coming from accessible pedestrian signal devices on separated poles located close to each crosswalk provides unambiguous information to pedestrians who are blind or visually impaired.</p>	<p><b>03 If two accessible pedestrian pushbuttons are placed less than 10 feet apart or on the same pole, each accessible pedestrian pushbutton shall be provided with the following features (see Sections 4E.11 through 4E.13):</b></p> <p><b>A. A pushbutton locator tone, B. A tactile arrow, C. A speech walk message for the WALKING PERSON (symbolizing WALK) indication, and D. A speech pushbutton information message.</b></p> <p><b>04 If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and accessible pedestrian detectors are used, an additional accessible pedestrian detector shall be provided in the median.</b></p> <p><b>Section 4E.11 Accessible Pedestrian Signals and Detectors – Walk Indications</b></p> <p>Support: 01 Technology that provides different sounds for each non-concurrent signal phase has frequently been found to provide ambiguous information. Research indicates that a rapid tick tone for each crossing coming from accessible pedestrian signal devices on separated poles located close to each crosswalk provides unambiguous information to pedestrians who are blind or visually impaired. Vibrotactile indications provide information to</p>	<p>Standard: If two accessible pedestrian pushbuttons are placed less than 10 feet apart or on the same pole, each accessible pedestrian pushbutton shall be provided with the following features (see Sections 4E.11 through 4E.13):</p> <p>A. A pushbutton locator tone, B. A tactile arrow, C. A speech walk message for the WALKING PERSON (symbolizing WALK) indication, and D. A speech pushbutton information message.</p> <p>If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and accessible pedestrian detectors are used, an additional accessible pedestrian detector shall be provided in the median.</p> <p><b>Section 4E.11 Accessible Pedestrian Signals and Detectors – Walk Indications</b></p> <p>Support: Technology that provides different sounds for each non-concurrent signal phase has frequently been found to provide ambiguous</p>	<p>Was not in Mn manual previously, not new fed language</p> <p>Recommend Mn language changed in this section to follow new standards set by federal manual.</p>
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<p>Vibrotactile indications provide information to pedestrians who are blind and deaf and are also used by pedestrians who are blind or who have low vision to confirm the walk signal in noisy situations.</p> <p>Standard: Accessible pedestrian signals shall have both audible and vibrotactile walk indications.</p> <p>Vibrotactile walk indications shall be provided by a tactile arrow on the pushbutton (see Section 4E.12) that vibrates during the walk interval.</p> <p><b>SUPPORT</b> <del>A vibrotactile pedestrian device communicates information about pedestrian timing through a vibrating surface by touch.</del></p> <p><b>STANDARD</b> <del>Vibrotactile pedestrian devices, where used, shall indicate that the walk interval is in effect, and for which direction it applies, through the use of a vibrating directional arrow or some other means.</del></p> <p><b>GUIDANCE:</b> <del>When provided, vibrotactile pedestrian devices should be located next to, and on the same pole as, the pedestrian pushbutton, if any, and adjacent to the intended crosswalk.</del></p> <p><b>COMPLIANCE DATE: JANUARY 17, 2005</b></p> <p><del>When</del> Accessible pedestrian signals shall have an audible tone(s), they shall have a tone for walk indication during the walk interval only. The audible tone(s)-walk indication shall be audible from the beginning of the associate crosswalk. The accessible walk indication shall have the</p>	<p>pedestrians who are blind and deaf and are also used by pedestrians who are blind or who have low vision to confirm the walk signal in noisy situations.</p> <p><b>Standard:</b> 02 Accessible pedestrian signals shall have both audible and vibrotactile walk indications. 03 Vibrotactile walk indications shall be provided by a tactile arrow on the pushbutton (see Section 4E.12) that vibrates during the walk interval. 04 Accessible pedestrian signals shall have an audible walk indication during the walk interval only. The audible walk indication shall be audible from the beginning of the associated crosswalk. 05 The accessible walk indication shall have the same duration as the pedestrian walk signal except when the pedestrian signal rests in walk.</p>	<p>information. Research indicates that a rapid tick tone for each crossing coming from accessible pedestrian signal devices on separated poles located close to each crosswalk provides unambiguous information to pedestrians who are blind or visually impaired. Vibrotactile indications provide information to pedestrians who are blind and deaf and are also used by pedestrians who are blind or who have low vision to confirm the walk signal in noisy situations.</p> <p>Standard: Accessible pedestrian signals shall have both audible and vibrotactile walk indications.</p> <p>Vibrotactile walk indications shall be provided by a tactile arrow on the pushbutton (see Section 4E.12) that vibrates during the walk interval.</p> <p>Accessible pedestrian signals shall have an audible walk indication during the walk interval only. The audible walk indication shall be audible from the beginning of the associate crosswalk. The accessible walk indication shall have the same duration as the pedestrian walk signal except when the pedestrian signal rests in walk.</p>	<p>This language was not in Mn manual. Likely because verbal message had to be used</p>
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<p>same duration as the pedestrian walk signal except when the pedestrian signal rests in walk.</p> <p><b>Guidance:</b> If the pedestrian signal rests in walk, the accessible walk indication should be limited to the first 7 seconds of the walk interval. The accessible walk indication should be recalled by a button press during the walk interval provided that the crossing time remaining is greater than the pedestrian change interval.</p> <p><b>Standard:</b> Where two accessible pedestrian signals are separated by a distance of at least 10 feet, the audible walk indication shall be a percussive tone. Where two accessible pedestrian signals on one corner are not separated by a distance of at least 10 feet, the audible walk indication shall be a speech walk message.</p> <p>Audible tone walk indications shall repeat at eight to ten ticks per second. Audible tones used as walk indications shall consist of multiple frequencies with a dominant component at 880 Hz.</p> <p><b>GUIDANCE</b> <b>Guidance:</b> The volume of audible walk indications and pushbutton locator tones (see Section 4E.12) should be set to be a maximum of 5 dBA louder than ambient sound, except when audible beaconing is provided in response to an extended pushbutton press.</p> <p><b>Standard:</b> Automatic volume adjustment in response to ambient traffic sound level <del>should</del> shall be</p>	<p><b>Guidance:</b> <i>06 If the pedestrian signal rests in walk, the accessible walk indication should be limited to the first 7 seconds of the walk interval. The accessible walk indication should be recalled by a button press during the walk interval provided that the crossing time remaining is greater than the pedestrian change interval.</i></p> <p><b>Standard:</b> <b>07 Where two accessible pedestrian signals are separated by a distance of at least 10 feet, the audible walk indication shall be a percussive tone. Where two accessible pedestrian signals on one corner are not separated by a distance of at least 10 feet, the audible walk indication shall be a speech walk message.</b> <b>08 Audible tone walk indications shall repeat at eight to ten ticks per second. Audible tones used as walk indications shall consist of multiple frequencies with a dominant component at 880 Hz.</b></p> <p><b>Guidance:</b> <i>09 The volume of audible walk indications and pushbutton locator tones (see Section 4E.12) should be set to be a maximum of 5 dBA louder than ambient sound, except when audible beaconing is provided in response to an extended pushbutton press.</i></p> <p><b>Standard:</b> <b>10 Automatic volume adjustment in response to ambient traffic sound level shall be provided up to a maximum volume of 100 dBA.</b></p>	<p><b>Guidance:</b> If the pedestrian signal rests in walk, the accessible walk indication should be limited to the first 7 seconds of the walk interval. The accessible walk indication should be recalled by a button press during the walk interval provided that the crossing time remaining is greater than the pedestrian change interval.</p> <p><b>Standard:</b> Where two accessible pedestrian signals are separated by a distance of at least 10 feet, the audible walk indication shall be a percussive tone. Where two accessible pedestrian signals on one corner are not separated by a distance of at least 10 feet, the audible walk indication shall be a speech walk message.</p> <p>Audible tone walk indications shall repeat at eight to ten ticks per second. Audible tones used as walk indications shall consist of multiple frequencies with a dominant component at 880 Hz.</p> <p><b>GUIDANCE</b> <b>Guidance:</b> The volume of audible walk indications and pushbutton locator tones (see Section 4E.12) should be set to be a maximum of 5 dBA louder than ambient sound, except when audible beaconing is provided in response to an</p>	<p>Not in 2005 MnMUTCD</p>
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<p>provided up to a maximum volume of <del>89</del> 100 dBA. <del>Where automatic volume adjustment is used, verbal messages should be no more than 5 dBA louder than ambient sound. The A-weighted sound pressure level should conform to the requirements of “ISO1996-1:1982” and “ISO 1996-2:1987” (see Page i for the address for the International Organization for Standards).</del></p> <p>Guidance: The sound level of audible <del>pedestrian tones</del> walk indications and pushbutton locator tones should be <del>carefully selected</del> adjusted to be low enough to avoid misleading pedestrians who have visual disabilities when the following conditions exist:</p> <p>A. Where there is an island that allows unsignalized right turns across a crosswalk between the island and the sidewalk.</p> <p>B. Where multi-leg approaches or complex signal phasing require more than two pedestrian phases, such that it might be unclear which crosswalk is served by each audible tone.</p> <p>C. At intersections where a diagonal pedestrian crossing is allowed, or where one street receives a WALKING PERSON (symbolizing WALK) signal indication simultaneously with another street.</p> <p>OPTION <del>The verbal messages may be made louder (up to a maximum of 89 dBA) by holding down the pushbutton for a minimum of 3 seconds.</del> An alert tone, which is a very brief burst of high-frequency sound at the beginning of the audible walk indication that rapidly decays to the frequency of the walk tone, may be used to alert pedestrians to the beginning of the walk interval.</p>	<p><i>Guidance:</i> <sup>11</sup> <i>The sound level of audible walk indications and pushbutton locator tones should be adjusted to be low enough to avoid misleading pedestrians who have visual disabilities when the following conditions exist:</i></p> <p><i>A. Where there is an island that allows unsignalized right turns across a crosswalk between the island and the sidewalk.</i></p> <p><i>B. Where multi-leg approaches or complex signal phasing require more than two pedestrian phases, such that it might be unclear which crosswalk is served by each audible tone.</i></p> <p><i>C. At intersections where a diagonal pedestrian crossing is allowed, or where one street receives a WALKING PERSON (symbolizing WALK) signal indication simultaneously with another street.</i></p> <p><i>Option:</i> <sup>12</sup> An alert tone, which is a very brief burst of high-frequency sound at the beginning of the audible walk indication that rapidly decays to the frequency of the walk tone, may be used to alert pedestrians to the beginning of the walk interval.</p> <p>Support:</p>	<p>extended pushbutton press.</p> <p>Standard:</p> <p>Automatic volume adjustment in response to ambient traffic sound level shall be provided up to a maximum volume of 100-dBA.</p> <p>Guidance: The sound level of audible walk indications and pushbutton locator tones should be adjusted to be low enough to avoid misleading pedestrians who have visual disabilities when the following conditions exist:</p> <p>A. Where there is an island that allows unsignalized right turns across a crosswalk between the island and the sidewalk.</p> <p>B. Where multi-leg approaches or complex signal phasing require more than two pedestrian phases, such that it might be unclear which crosswalk is served by each audible tone.</p> <p>C. At intersections where a diagonal pedestrian crossing is allowed, or where one street receives a WALKING PERSON (symbolizing WALK) signal indication simultaneously with another street.</p>	
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<p>Support: An alert tone can be particularly useful if the walk tone is not easily audible in some traffic conditions.</p> <p>Speech walk messages communicate to pedestrians which street has the walk interval. Speech messages might be either directly audible or transmitted, requiring a personal receiver to hear the message. To be a useful system, the words and their meaning need to be correctly understood by all users in the context of the street environment where they are used. Because of this, tones are the preferred means of providing audible walk indications except where two accessible pedestrian signals on one corner are not separated by a distance of at least 10 feet.</p> <p>If speech walk messages are used, pedestrians have to know the names of the streets that they are crossing in order for the speech walk messages to be unambiguous. In getting directions to travel to a new location, pedestrians with visual disabilities do not always get the name of each street to be crossed. Therefore, it is desirable to give users of accessible pedestrian signals the name of the street controlled by the pushbutton. This can be done by means of a speech pushbutton information message (see Section 4D.13) during the flashing or steady UPRAISED HAND intervals, or by raised print and Braille labels on the pushbutton housing.</p> <p>By combining the information from the pushbutton message or Braille label, the tactile arrow aligned in the direction of travel on the relevant crosswalk, and the speech walk</p>	<p>13 An alert tone can be particularly useful if the walk tone is not easily audible in some traffic conditions.</p> <p>14 Speech walk messages communicate to pedestrians which street has the walk interval. Speech messages might be either directly audible or transmitted, requiring a personal receiver to hear the message. To be a useful system, the words and their meaning need to be correctly understood by all users in the context of the street environment where they are used. Because of this, tones are the preferred means of providing audible walk indications except where two accessible pedestrian signals on one corner are not separated by a distance of at least 10 feet.</p> <p>15 If speech walk messages are used, pedestrians have to know the names of the streets that they are crossing in order for the speech walk messages to be unambiguous. In getting directions to travel to a new location, pedestrians with visual disabilities do not always get the name of each street to be crossed. Therefore, it is desirable to give users of accessible pedestrian signals the name of the street controlled by the pushbutton. This can be done by means of a speech pushbutton information message (see Section 4D.13) during the flashing or steady UPRAISED HAND intervals, or by raised print and Braille labels on the pushbutton housing.</p> <p>16 By combining the information from the pushbutton message or Braille label, the tactile arrow aligned in the direction of travel on the relevant crosswalk, and the speech walk message, pedestrians with visual disabilities are able to correctly respond to speech walk messages even if there are two pushbuttons on the same pole.</p>	<p>OPTION</p> <p>An alert tone, which is a very brief burst of high-frequency sound at the beginning of the audible walk indication that rapidly decays to the frequency of the walk tone, may be used to alert pedestrians to the beginning of the walk interval.</p> <p>Support: An alert tone can be particularly useful if the walk tone is not easily audible in some traffic conditions.</p> <p>Speech walk messages communicate to pedestrians which street has the walk interval. Speech messages might be either directly audible or transmitted, requiring a personal receiver to hear the message. To be a useful system, the words and their meaning need to be correctly understood by all users in the context of the street environment where they are used. Because of this, tones are the preferred means of providing audible walk indications except where two accessible pedestrian signals on one corner are not separated by a distance of at least 10 feet.</p> <p>If speech walk messages are used, pedestrians have to know the names of the streets that they are crossing in order for the speech walk messages to be unambiguous. In getting directions to travel to a new location, pedestrians with visual disabilities do not always get the name of each street to be crossed. Therefore, it is desirable to give users of accessible pedestrian signals the name of the</p>	
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<p>message, pedestrians with visual disabilities are able to correctly respond to speech walk messages even if there are two pushbuttons on the same pole.</p> <p>STANDARD</p> <p><del>Verbal messages shall be</del> <b>If speech walk messages are</b> used to communicate the <del>pedestrian walk</del> interval, <del>and they</del> shall provide a clear message that the walk interval is in effect, as well as to which crossing it applies. <b>Speech walk messages shall be used only at intersections where it is technically infeasible to install two accessible pedestrian signals at one corner separated by a distance of at least 10 feet.</b></p> <p><del>The verbal message that is provided at regular intervals throughout the timing of the walk interval shall be the term “walk sign,” which may be followed by the name of the street to be crossed.</del></p> <p>Speech walk messages that are used at intersections having pedestrian phasing that is concurrent with vehicular phasing shall be patterned after the model: “Broadway. Walk sign is on to cross Broadway.”</p> <p>Speech walk messages that are used at intersections having exclusive pedestrian phasing shall be patterned after the model: “Walk sign is on for all crossings.”</p> <p>Speech walk messages shall not contain any additional information, except they shall include designations such as “Street” or “Avenue” where this information is necessary to avoid ambiguity at a particular location.</p> <p>Guidance: Speech walk messages should not state or imply a command to the pedestrian, such as</p>	<p><b>Standard:</b></p> <p>17 <b>If speech walk messages are used to communicate the walk interval, they shall provide a clear message that the walk interval is in effect, as well as to which crossing it applies. Speech walk messages shall be used only at intersections where it is technically infeasible to install two accessible pedestrian signals at one corner separated by a distance of at least 10 feet.</b></p> <p>18 <b>Speech walk messages that are used at intersections having pedestrian phasing that is concurrent with vehicular phasing shall be patterned after the model: “Broadway. Walk sign is on to cross Broadway.”</b></p> <p>19 <b>Speech walk messages that are used at intersections having exclusive pedestrian phasing shall be patterned after the model: “Walk sign is on for all crossings.”</b></p> <p>20 <b>Speech walk messages shall not contain any additional information, except they shall include designations such as “Street” or “Avenue” where this information is necessary to avoid ambiguity at a particular location.</b></p> <p><i>Guidance:</i> 21 <i>Speech walk messages should not state or imply a command to the pedestrian, such as “Cross Broadway now.” Speech walk</i></p>	<p>street controlled by the pushbutton. This can be done by means of a speech pushbutton information message (see Section 4D.13) during the flashing or steady UPRaised HAND intervals, or by raised print and Braille labels on the pushbutton housing.</p> <p>By combining the information from the pushbutton message or Braille label, the tactile arrow aligned in the direction of travel on the relevant crosswalk, and the speech walk message, pedestrians with visual disabilities are able to correctly respond to speech walk messages even if there are two pushbuttons on the same pole.</p> <p>STANDARD</p> <p><b>If speech walk messages are</b> used to communicate the walk interval, they shall provide a clear message that the walk interval is in effect, as well as to which crossing it applies. <b>Speech walk messages shall be used only at intersections where it is technically infeasible to install two accessible pedestrian signals at one corner separated by a distance of at least 10 feet.</b></p> <p>Speech walk messages that are used at intersections having pedestrian phasing that is concurrent with vehicular phasing shall be patterned after the model: “Broadway. Walk sign is on to cross Broadway.”</p> <p>Speech walk messages that are used at intersections having exclusive pedestrian phasing shall be patterned after the model: “Walk sign is on for all crossings.”</p> <p>Speech walk messages shall not contain any additional information, except they shall include designations such as “Street” or</p>	
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<p>“Cross Broadway now.” Speech walk messages should not tell pedestrians that it is “safe to cross,” because it is always the pedestrian’s responsibility to check actual traffic conditions.</p> <p><b>Standard:</b> A <del>verbal</del> speech walk message is not required at times when the walk interval is not timing, but, if provided: A. It shall <del>be</del> begin with the term “wait.” B. It need not be repeated for the entire time that the walk interval is not timing. If a pilot light (see Section 4E.08) is used at an accessible pedestrian signal location, each actuation shall be accompanied by the speech message “wait.”</p> <p><b>OPTION</b> Accessible pedestrian signals that provide <del>verbal</del> speech walk messages may provide similar messages in languages other than English, if needed, except for the terms “walk sign” and “wait.”</p> <p><b>Standard:</b> Following the audible walk indication, accessible pedestrian signals shall revert to the pushbutton locator tone (see Section 4E.12) during the pedestrian change interval.</p> <p><b>Section 4E.12 Accessible Pedestrian Signals and Detectors – Tactile Arrows and Locator Tones</b></p> <p><b><del>GUIDANCE</del></b> To enable pedestrians who have visual disabilities to distinguish and locate the appropriate pushbutton at an <del>A</del> accessible</p>	<p><i>messages should not tell pedestrians that it is “safe to cross,” because it is always the pedestrian’s responsibility to check actual traffic conditions.</i></p> <p><b>Standard:</b> 22 <b>A speech walk message is not required at times when the walk interval is not timing, but, if provided:</b> <b>A. It shall begin with the term “wait.”</b> <b>B. It need not be repeated for the entire time that the walk interval is not timing.</b> 23 <b>If a pilot light (see Section 4E.08) is used at an accessible pedestrian signal location, each actuation shall be accompanied by the speech message “wait.”</b> Option: 24 Accessible pedestrian signals that provide speech walk messages may provide similar messages in languages other than English, if needed, except for the terms “walk sign” and “wait.”</p> <p><b>Standard:</b> 25 <b>Following the audible walk indication, accessible pedestrian signals shall revert to the pushbutton locator tone (see Section 4E.12) during the pedestrian change interval.</b></p> <p><b>Section 4E.12 Accessible Pedestrian Signals and Detectors – Tactile Arrows and Locator Tones</b> <b>Standard:</b> 01 <b>To enable pedestrians who have visual disabilities to distinguish and locate the appropriate pushbutton at an accessible pedestrian signal location, pushbuttons shall</b></p>	<p>“Avenue” where this information is necessary to avoid ambiguity at a particular location.</p> <p><b>Guidance:</b> Speech walk messages should not state or imply a command to the pedestrian, such as “Cross Broadway now.” Speech walk messages should not tell pedestrians that it is “safe to cross,” because it is always the pedestrian’s responsibility to check actual traffic conditions.</p> <p><b>Standard:</b> A speech walk message is not required at times when the walk interval is not timing, but, if provided: A. It shall begin with the term “wait.” B. It need not be repeated for the entire time that the walk interval is not timing. If a pilot light (see Section 4E.08) is used at an accessible pedestrian signal location, each actuation shall be accompanied by the speech message “wait.”</p> <p><b>OPTION</b> Accessible pedestrian signals that provide speech walk messages may provide similar messages in languages other than English, if needed, except for the terms “walk sign” and “wait.”</p> <p><b>Standard:</b> Following the audible walk indication, accessible pedestrian signals shall revert to the pushbutton locator tone (see Section 4E.12) during the pedestrian change interval.</p> <p><b>Section 4E.12 Accessible Pedestrian Signals and Detectors – Tactile Arrows</b></p>	<p>Recommend changing per federal manual</p>
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<p>pedestrian signal locations, pushbuttons <del>should</del> shall clearly indicate by means of tactile arrows which crosswalk signal is actuated by each pushbutton. <del>Pushbuttons and tactile arrows should</del> shall be located on the pushbutton, have high visual contrast as described in the “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11). (light on dark or dark on light) and shall be aligned parallel to the <del>Tactile arrows should point in the same</del> direction as- of travel on the associated crosswalk.</p> <p><del>At An</del> accessible pedestrian <del>signal locations with pedestrian actuation,</del> pushbutton shall incorporate locator tones <del>shall be used</del></p> <p>Support: A pushbutton locator tone is a repeating sound that informs approaching pedestrians that a pushbutton to actuate pedestrian timing or receive additional information exists, and that enables pedestrians with visual disabilities to locate the pushbutton.</p> <p>STANDARD Pushbutton locator tones <del>shall be easily locatable,</del> shall have a duration of 0.15 seconds or less; and shall repeat at 1-second intervals. Pushbutton locator tones <del>should</del> shall be deactivated <del>during flashing operation of</del> when the traffic control signal is operating in a flashing mode. This requirement shall not apply to traffic control signals or pedestrian hybrid beacons that are activated from a flashing or dark mode to a stop-and-go mode by pedestrian actuations. <del>Pushbuttons should be audibly locatable.</del> Pushbutton locator tones <del>should</del> shall be intensity responsive to ambient sound, and be</p>	<p>clearly indicate by means of tactile arrows which crosswalk signal is actuated by each pushbutton. Tactile arrows shall be located on the pushbutton, have high visual contrast (light on dark or dark on light), and shall be aligned parallel to the direction of travel on the associated crosswalk.</p> <p>02 An accessible pedestrian pushbutton shall incorporate a locator tone.</p> <p>Support: 03 A pushbutton locator tone is a repeating sound that informs approaching pedestrians that a pushbutton to actuate pedestrian timing or receive additional information exists, and that enables pedestrians with visual disabilities to locate the pushbutton.</p> <p>Standard: 04 Pushbutton locator tones shall have a duration of 0.15 seconds or less, and shall repeat at 1-second intervals. 05 Pushbutton locator tones shall be deactivated when the traffic control signal is operating in a flashing mode. This requirement shall not apply to traffic control signals or pedestrian hybrid beacons that are activated from a flashing or dark mode to a stop-and-go mode by pedestrian actuations. 06 Pushbutton locator tones shall be intensity responsive to ambient sound, and be audible 6 to 12 feet from the pushbutton, or to the building line, whichever is less.</p> <p>Support: 07 Section 4E.11 contains additional provisions regarding the volume and sound level of pushbutton locator tones.</p>	<p><b>and Locator Tones</b></p> <p>To enable pedestrians who have visual disabilities to distinguish and locate the appropriate pushbutton at an accessible pedestrian signal location, pushbuttons shall clearly indicate by means of tactile arrows which crosswalk signal is actuated by each pushbutton. Tactile arrows shall be located on the pushbutton, have high visual contrast (light on dark or dark on light) and shall be aligned parallel to the direction of travel on the associated crosswalk.</p> <p>An accessible pedestrian <b>pushbutton</b> shall incorporate <b>locator tone</b>.</p> <p>Support: A pushbutton locator tone is a repeating sound that informs approaching pedestrians that a pushbutton to actuate pedestrian timing or receive additional information exists, and that enables pedestrians with visual disabilities to locate the pushbutton.</p> <p>STANDARD Pushbutton locator tones shall have a duration of 0.15 seconds or less and shall repeat at 1-second intervals. Pushbutton locator tones shall be deactivated when the traffic control signal is operating in a flashing mode. This requirement shall not apply to traffic control signals or pedestrian hybrid beacons that are activated from a flashing or dark mode to a stop-and-go mode by pedestrian actuations. Pushbutton locator tones shall be intensity responsive to ambient sound, and be audible 1.8 to 3.7 m (6 to 12 ft) from the pushbutton, or to the building line, whichever is less.</p>	<p>Recommend federal language with one change below</p>
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<p>audible 1.8 to 3.7 m (6 to 12 ft) from the pushbutton, or to the building line, whichever is less. <del>Pushbutton locator tones should be no more than 5 dBA louder than ambient sound.</del></p> <p>Support: Section 4E.11 contains additional provisions regarding the volume and sound level of pushbutton locator tones.</p> <p><b>Section 4E.13 Accessible Pedestrian Signals and Detectors – Extended Pushbutton Press Features</b></p> <p>Option: Pedestrians may be provided with additional features such as increased crossing time, audible beaconing, or a speech pushbutton information message as a result of an extended pushbutton press.</p> <p>Standard: If an extended pushbutton press is used to provide any additional feature(s), a pushbutton press of less than one second shall actuate only the pedestrian timing and any associated accessible walk indication, and a pushbutton press of <del>one</del> <b>two</b> seconds or more shall actuate the pedestrian timing, any associated accessible walk indication, and any additional feature(s).</p> <p>If additional crossing time is provided by means of an extended pushbutton press, a <b>PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P)</b> plaque (see Figure 2B-26) shall be mounted adjacent to or integral with the pedestrian pushbutton.</p>	<p><b>Section 4E.13 Accessible Pedestrian Signals and Detectors – Extended Pushbutton Press Features</b></p> <p>Option: 01 Pedestrians may be provided with additional features such as increased crossing time, audible beaconing, or a speech pushbutton information message as a result of an extended pushbutton press.</p> <p><b>Standard:</b> 02 <b>If an extended pushbutton press is used to provide any additional feature(s), a pushbutton press of less than one second shall actuate only the pedestrian timing and any associated accessible walk indication, and a pushbutton press of one second or more shall actuate the pedestrian timing, any associated accessible walk indication, and any additional feature(s).</b></p> <p>03 <b>If additional crossing time is provided by means of an extended pushbutton press, a PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P) plaque (see Figure 2B-26) shall be mounted adjacent to or integral with the pedestrian pushbutton.</b></p> <p>Support: 04 Audible beaconing is the use of an audible signal in such a way that pedestrians with</p>	<p>Support: Section 4E.11 contains additional provisions regarding the volume and sound level of pushbutton locator tones.</p> <p><b>Section 4E.13 Accessible Pedestrian Signals and Detectors – Extended Pushbutton Press Features</b></p> <p>Option: Pedestrians may be provided with additional features such as increased crossing time, audible beaconing, or a speech pushbutton information message as a result of an extended pushbutton press.</p> <p>Standard: If an extended pushbutton press is used to provide any additional feature(s), a pushbutton press of less than one second shall actuate only the pedestrian timing and any associated accessible walk indication, and a pushbutton press of <b>two</b> seconds or more shall actuate the pedestrian timing, any associated accessible walk indication, and any additional feature(s).</p> <p>If additional crossing time is provided by</p>	<p>Would like longer time for extended push</p>
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<p><b>Support:</b> Audible beaconing is the use of an audible signal in such a way that pedestrians with visual disabilities can home in on the signal that is located on the far end of the crosswalk as they cross the street.</p> <p>Not all crosswalks at an intersection need audible beaconing; audible beaconing can actually cause confusion if used at all crosswalks at some intersections. Audible beaconing is not appropriate at locations with channelized turns or split phasing, because of the possibility of confusion.</p> <p><b>Guidance:</b> Audible beaconing should only be considered following an engineering study at: A. Crosswalks longer than 70 feet, unless they are divided by a median that has another accessible pedestrian signal with a locator tone; B. Crosswalks that are skewed; C. Intersections with irregular geometry, such as more than four legs; D. Crosswalks where audible beaconing is requested by an individual with visual disabilities; or E. Other locations where a study indicates audible beaconing would be beneficial.</p> <p><b>Option:</b> Audible beaconing may be provided in several ways, any of which are initiated by an extended pushbutton press.</p> <p><b>Standard:</b> If audible beaconing is used, the volume of the pushbutton locator tone during the pedestrian change interval of the called pedestrian phase</p>	<p>visual disabilities can home in on the signal that is located on the far end of the crosswalk as they cross the street.</p> <p>05 Not all crosswalks at an intersection need audible beaconing; audible beaconing can actually cause confusion if used at all crosswalks at some intersections. Audible beaconing is not appropriate at locations with channelized turns or split phasing, because of the possibility of confusion.</p> <p><b>Guidance:</b> 06 Audible beaconing should only be considered following an engineering study at: A. Crosswalks longer than 70 feet, unless they are divided by a median that has another accessible pedestrian signal with a locator tone; B. Crosswalks that are skewed; C. Intersections with irregular geometry, such as more than four legs; D. Crosswalks where audible beaconing is requested by an individual with visual disabilities; or E. Other locations where a study indicates audible beaconing would be beneficial.</p> <p><b>Option:</b> 07 Audible beaconing may be provided in several ways, any of which are initiated by an extended pushbutton press.</p> <p><b>Standard:</b> 08 <b>If audible beaconing is used, the volume of the pushbutton locator tone during the pedestrian change interval of the called pedestrian phase shall be increased and operated in one of the following ways:</b> <b>A. The louder audible walk indication and louder locator tone comes from the far end of the crosswalk, as pedestrians cross the street,</b> <b>B. The louder locator tone comes from both</b></p>	<p>means of an extended pushbutton press, a PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (R10-32P) plaque (see Figure 2B-26) shall be mounted adjacent to or integral with the pedestrian pushbutton.</p> <p><b>Support:</b> Audible beaconing is the use of an audible signal in such a way that pedestrians with visual disabilities can home in on the signal that is located on the far end of the crosswalk as they cross the street.</p> <p>Not all crosswalks at an intersection need audible beaconing; audible beaconing can actually cause confusion if used at all crosswalks at some intersections. Audible beaconing is not appropriate at locations with channelized turns or split phasing, because of the possibility of confusion.</p> <p><b>Guidance:</b> Audible beaconing should only be considered following an engineering study at: A. Crosswalks longer than 70 feet, unless they are divided by a median that has another accessible pedestrian signal with a locator tone; B. Crosswalks that are skewed; C. Intersections with irregular geometry, such as more than four legs; D. Crosswalks where audible beaconing is requested by an individual with visual disabilities; or E. Other locations where a study indicates audible beaconing would be beneficial.</p> <p><b>Option:</b> Audible beaconing may be provided in several ways, any of which are initiated by an extended pushbutton press.</p>	
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<p>shall be increased and operated in one of the following ways:</p> <p>A. The louder audible walk indication and louder locator tone comes from the far end of the crosswalk, as pedestrians cross the street,</p> <p>B. The louder locator tone comes from both ends of the crosswalk, or</p> <p>C. The louder locator tone comes from an additional speaker that is aimed at the center of the crosswalk and that is mounted on a pedestrian signal head.</p> <p>Option: Speech pushbutton information messages may provide intersection identification, as well as information about unusual intersection signalization and geometry, such as notification regarding exclusive pedestrian phasing, leading pedestrian intervals, split phasing, diagonal crosswalks, and medians or islands.</p> <p>Standard: If speech pushbutton information messages are made available by actuating the accessible pedestrian signal detector, they shall only be actuated when the walk interval is not timing. They shall begin with the term “Wait,” followed by intersection identification information modeled after: “Wait to cross Broadway at Grand.” If information on intersection signalization or geometry is also given, it shall follow the intersection identification information.</p> <p>Guidance: Speech pushbutton information messages should not be used to provide landmark information or to inform pedestrians with visual disabilities about detours or temporary</p>	<p><b>ends of the crosswalk, or</b></p> <p><b>C. The louder locator tone comes from an additional speaker that is aimed at the center of the crosswalk and that is mounted on a pedestrian signal head.</b></p> <p>Option: 09 Speech pushbutton information messages may provide intersection identification, as well as information about unusual intersection signalization and geometry, such as notification regarding exclusive pedestrian phasing, leading pedestrian intervals, split phasing, diagonal crosswalks, and medians or islands.</p> <p><b>Standard:</b> 10 <b>If speech pushbutton information messages are made available by actuating the accessible pedestrian signal detector, they shall only be actuated when the walk interval is not timing. They shall begin with the term “Wait,” followed by intersection identification information modeled after: “Wait to cross Broadway at Grand.” If information on intersection signalization or geometry is also given, it shall follow the intersection identification information.</b></p> <p><i>Guidance:</i> 11 <i>Speech pushbutton information messages should not be used to provide landmark information or to inform pedestrians with visual disabilities about detours or temporary traffic control situations.</i></p> <p>Support: 12 Additional information on the structure and wording of speech pushbutton information messages is included in ITE’s “Electronic Toolbox for Making Intersections More Accessible</p>	<p>Standard: If audible beaconing is used, the volume of the pushbutton locator tone during the pedestrian change interval of the called pedestrian phase shall be increased and operated in one of the following ways:</p> <p>A. The louder audible walk indication and louder locator tone comes from the far end of the crosswalk, as pedestrians cross the street,</p> <p>B. The louder locator tone comes from both ends of the crosswalk, or</p> <p>C. The louder locator tone comes from an additional speaker that is aimed at the center of the crosswalk and that is mounted on a pedestrian signal head.</p> <p>Option: Speech pushbutton information messages may provide intersection identification, as well as information about unusual intersection signalization and geometry, such as notification regarding exclusive pedestrian phasing, leading pedestrian intervals, split phasing, diagonal crosswalks, and medians or islands.</p> <p>Standard: If speech pushbutton information messages are made available by actuating the accessible pedestrian signal detector, they shall only be actuated when the walk interval is not timing. They shall begin with the term “Wait,” followed by intersection identification information modeled after: “Wait to cross Broadway at Grand.” If information on intersection signalization or geometry is also given, it shall follow the intersection identification information.</p>	<p>Recommend add federal language – one deletion requested as shown</p>
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<p>traffic control situations.</p> <p>Support: Additional information on the structure and wording of speech pushbutton information messages is included in ITE’s “Electronic Toolbox for Making Intersections More Accessible</p> <p><b>CHAPTER 4F. PEDESTRIAN HYBRID BEACONS</b></p> <p><b>Section 4F.01 Application of Pedestrian Hybrid Beacons</b></p> <p>Support: A pedestrian hybrid beacon is a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.</p> <p>Option: A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C), or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal.</p> <p>Standard: If used, pedestrian hybrid beacons shall be used in conjunction with signs and pavement markings to warn and control traffic at locations where pedestrians enter or cross a street or highway. A pedestrian hybrid beacon shall only be installed at a marked crosswalk.</p>	<p><b>CHAPTER 4F. PEDESTRIAN HYBRID BEACONS</b></p> <p><b>Section 4F.01 Application of Pedestrian Hybrid Beacons</b></p> <p>Support: 01 A pedestrian hybrid beacon is a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.</p> <p>Option: 02 A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C), or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal.</p> <p><b>Standard:</b> 03 <b>If used, pedestrian hybrid beacons shall be used in conjunction with signs and pavement markings to warn and control traffic at locations where pedestrians enter or cross a street or highway. A pedestrian hybrid beacon shall only be installed at a marked crosswalk.</b></p>	<p>Guidance: Speech pushbutton information messages should not be used to provide landmark information or to inform pedestrians with visual disabilities about detours or temporary traffic control situations.</p> <p>Support: Additional information on the structure and wording of speech pushbutton information messages is included in ITE’s “Electronic Toolbox for Making Intersections More Accessible</p> <p><b>CHAPTER 4F. PEDESTRIAN HYBRID BEACONS</b></p> <p><b>Section 4F.01 Application of Pedestrian Hybrid Beacons</b></p> <p>Support: A pedestrian hybrid beacon is a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.</p> <p>Option: A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C), or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal.</p> <p>Standard:</p>	
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<p><b>Guidance:</b> If one of the signal warrants of Chapter 4C is met and a traffic control signal is justified by an engineering study, and if a decision is made to install a traffic control signal, it should be installed based upon the provisions of Chapters 4D and 4E.</p> <p>If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit pedestrians to cross, <del>or if the speed for vehicles approaching on the major street is too high to permit pedestrians to cross</del>, or if pedestrian delay is excessive, the need for a pedestrian hybrid beacon should be considered on the basis of an engineering study that considers major-street volumes, speeds, widths, and gaps in conjunction with pedestrian volumes, walking speeds, and delay.</p> <p>For a major street where the posted or statutory speed limit or the 85th-percentile speed is 35 mph or less, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-1 for the length of the crosswalk.</p> <p>For a major street where the posted or statutory speed limit or the 85th-percentile speed exceeds 35 mph, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major</p>	<p><b>Guidance:</b> <i>04 If one of the signal warrants of Chapter 4C is met and a traffic control signal is justified by an engineering study, and if a decision is made to install a traffic control signal, it should be installed based upon the provisions of Chapters 4D and 4E.</i></p> <p><i>05 If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit pedestrians to cross, or if the speed for vehicles approaching on the major street is too high to permit pedestrians to cross, or if pedestrian delay is excessive, the need for a pedestrian hybrid beacon should be considered on the basis of an engineering study that considers major-street volumes, speeds, widths, and gaps in conjunction with pedestrian volumes, walking speeds, and delay.</i></p> <p><i>06 For a major street where the posted or statutory speed limit or the 85th-percentile speed is 35 mph or less, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-1 for the length of the crosswalk.</i></p> <p><i>07 For a major street where the posted or statutory speed limit or the 85th-percentile speed exceeds 35 mph, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four</i></p>	<p>If used, pedestrian hybrid beacons shall be used in conjunction with signs and pavement markings to warn and control traffic at locations where pedestrians enter or cross a street or highway. A pedestrian hybrid beacon shall only be installed at a marked crosswalk.</p> <p><b>Guidance:</b> If one of the signal warrants of Chapter 4C is met and a traffic control signal is justified by an engineering study, and if a decision is made to install a traffic control signal, it should be installed based upon the provisions of Chapters 4D and 4E.</p> <p>If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit pedestrians to cross, or if pedestrian delay is excessive, the need for a pedestrian hybrid beacon should be considered on the basis of an engineering study that considers major-street volumes, speeds, widths, and gaps in conjunction with pedestrian volumes, walking speeds, and delay.</p> <p>For a major street where the posted or statutory speed limit or the 85th-percentile speed is 35 mph or less, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-1 for the length of the crosswalk.</p> <p>For a major street where the posted or statutory speed limit or the 85th-percentile speed</p>	<p>Recommend add federal language. Mn text added in bold as guidance for installations at intersections</p>
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<p>street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-2 for the length of the crosswalk.</p> <p>08 For crosswalks that have lengths other than the four that are specifically shown in Figures 4F-1 and 4F-2, the values should be interpolated between the curves.</p> <p><b>Section 4F.02 Design of Pedestrian Hybrid Beacons</b></p> <p>Standard: Except as otherwise provided in this Section, a pedestrian hybrid beacon shall meet the provisions of Chapters 4D and 4E.</p> <p>A pedestrian hybrid beacon face shall consist of three signal sections, with a CIRCULAR YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal indications (see Figure 4F-3).</p> <p>When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:</p> <p>A. At least two pedestrian hybrid beacon faces shall be installed for each approach of the major street,  B. A stop line shall be installed for each approach to the crosswalk,  C. A pedestrian signal head conforming to the provisions set forth in Chapter 4E shall be installed at each end of the marked crosswalk, and  D. The pedestrian hybrid beacon shall be</p>	<p><i>consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-2 for the length of the crosswalk.</i></p> <p><i>08 For crosswalks that have lengths other than the four that are specifically shown in Figures 4F-1 and 4F-2, the values should be interpolated between the curves.</i></p> <p><b>Section 4F.02 Design of Pedestrian Hybrid Beacons</b>  <b>Standard:</b>  01 <b>Except as otherwise provided in this Section, a pedestrian hybrid beacon shall meet the provisions of Chapters 4D and 4E.</b>  02 <b>A pedestrian hybrid beacon face shall consist of three signal sections, with a CIRCULAR YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal indications (see Figure 4F-3).</b>  03 <b>When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:</b>  <b>A. At least two pedestrian hybrid beacon faces shall be installed for each approach of the major street,</b>  <b>B. A stop line shall be installed for each approach to the crosswalk,</b>  <b>C. A pedestrian signal head conforming to the provisions set forth in Chapter 4E shall be installed at each end of the marked crosswalk, and</b>  <b>D. The pedestrian hybrid beacon shall be pedestrian actuated.</b></p> <p><i>Guidance:</i>  04 <i>When an engineering study finds that</i></p>	<p>exceeds 35 mph, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-2 for the length of the crosswalk.</p> <p>08 For crosswalks that have lengths other than the four that are specifically shown in Figures 4F-1 and 4F-2, the values should be interpolated between the curves.</p> <p><b>Section 4F.02 Design of Pedestrian Hybrid Beacons</b></p> <p>Standard: Except as otherwise provided in this Section, a pedestrian hybrid beacon shall meet the provisions of Chapters 4D and 4E.</p> <p>A pedestrian hybrid beacon face shall consist of three signal sections, with a CIRCULAR YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal indications (see Figure 4F-3).</p> <p>When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:</p> <p>A. At least two pedestrian hybrid beacon faces shall be installed for each approach of the major street,  B. A stop line shall be installed for each</p>	<p>Mn text</p>
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<p>pedestrian actuated.</p> <p>Guidance:</p> <p>When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:</p> <p>A. The pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs <b>when not installed at an intersection,</b></p> <p>B. Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk, or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance,</p> <p>C. The installation should include suitable standard signs and pavement markings, and</p> <p>D. If installed within a signal system, the pedestrian hybrid beacon should be coordinated.</p> <p><b>E. If installed at an intersection appropriate side street traffic control should be considered.</b></p> <p>On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 35 mph and on approaches having traffic or operating conditions that would tend to obscure visibility of roadside hybrid beacon face locations, both of the minimum of two pedestrian hybrid beacon faces should be installed over the roadway.</p> <p>On multi-lane approaches having a posted or statutory speed limits or 85th-percentile speeds of 35 mph or less, either a pedestrian hybrid beacon face should be installed on each side of</p>	<p><i>installation of a pedestrian hybrid beacon is justified, then:</i></p> <p><i>A. The pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs,</i></p> <p><i>B. Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk, or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance,</i></p> <p><i>C. The installation should include suitable standard signs and pavement markings, and</i></p> <p><i>D. If installed within a signal system, the pedestrian hybrid beacon should be coordinated.</i></p> <p><i>05 On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 35 mph and on approaches having traffic or operating conditions that would tend to obscure visibility of roadside hybrid beacon face locations, both of the minimum of two pedestrian hybrid beacon faces should be installed over the roadway.</i></p> <p><i>06 On multi-lane approaches having a posted or statutory speed limits or 85th-percentile speeds of 35 mph or less, either a pedestrian hybrid beacon face should be installed on each side of the approach (if a median of sufficient width exists) or at least one of the pedestrian hybrid beacon faces should be installed over the roadway.</i></p> <p><i>07 A pedestrian hybrid beacon should comply with the signal face location provisions described in Sections 4D.11 through 4D.16.</i></p> <p><b>Standard:</b></p> <p><b>08 A CROSSWALK STOP ON RED (symbolic circular red) (R10-23) sign (see Section 2B.53) shall be mounted adjacent to</b></p>	<p>approach to the crosswalk,</p> <p>C. A pedestrian signal head conforming to the provisions set forth in Chapter 4E shall be installed at each end of the marked crosswalk, and</p> <p>D. The pedestrian hybrid beacon shall be pedestrian actuated.</p> <p>Guidance:</p> <p>When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:</p> <p>A. The pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs <b>when not installed at an intersection,</b></p> <p>B. Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk, or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance,</p> <p>C. The installation should include suitable standard signs and pavement markings, and</p> <p>D. If installed within a signal system, the pedestrian hybrid beacon should be coordinated.</p> <p><b>E. If installed at an intersection appropriate side street traffic control should be considered.</b></p> <p>On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 35 mph and on approaches having traffic or operating conditions that would tend to obscure visibility of roadside hybrid beacon face locations, both of the minimum of two pedestrian hybrid beacon faces should be</p>	<p>Mn text</p>
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<p>the approach (if a median of sufficient width exists) or at least one of the pedestrian hybrid beacon faces should be installed over the roadway.</p> <p>A pedestrian hybrid beacon should comply with the signal face location provisions described in Sections 4D.11 through 4D.16.</p> <p>Standard: A CROSSWALK STOP ON RED (symbolic circular red) (R10-23) sign (see Section 2B.53) shall be mounted adjacent to a pedestrian hybrid beacon face on each major street approach. If an overhead pedestrian hybrid beacon face is provided, the sign shall be mounted adjacent to the overhead signal face.</p> <p>Option: A Pedestrian (W11-2) warning sign (see Section 2C.50) with an AHEAD (W16-9P) supplemental plaque may be placed in advance of a pedestrian hybrid beacon. A warning beacon may be installed to supplement the W11-2 sign.</p> <p>Guidance: If a warning beacon supplements a W11-2 sign in advance of a pedestrian hybrid beacon, it should be programmed to flash only when the pedestrian hybrid beacon is not in the dark mode.</p> <p>Standard: If a warning beacon is installed to supplement the W11-2 sign, the design and location of the warning beacon shall comply with the provisions of Sections 4L.01 and 4L.03.</p>	<p><b>a pedestrian hybrid beacon face on each major street approach. If an overhead pedestrian hybrid beacon face is provided, the sign shall be mounted adjacent to the overhead signal face.</b></p> <p>Option: 09 A Pedestrian (W11-2) warning sign (see Section 2C.50) with an AHEAD (W16-9P) supplemental plaque may be placed in advance of a pedestrian hybrid beacon. A warning beacon may be installed to supplement the W11-2 sign.</p> <p>Guidance: 10 <i>If a warning beacon supplements a W11-2 sign in advance of a pedestrian hybrid beacon, it should be programmed to flash only when the pedestrian hybrid beacon is not in the dark mode.</i></p> <p><b>Standard:</b> 11 <b>If a warning beacon is installed to supplement the W11-2 sign, the design and location of the warning beacon shall comply with the provisions of Sections 4L.01 and 4L.03.</b></p>	<p>installed over the roadway.</p> <p>On multi-lane approaches having a posted or statutory speed limits or 85th-percentile speeds of 35 mph or less, either a pedestrian hybrid beacon face should be installed on each side of the approach (if a median of sufficient width exists) or at least one of the pedestrian hybrid beacon faces should be installed over the roadway.</p> <p>A pedestrian hybrid beacon should comply with the signal face location provisions described in Sections 4D.11 through 4D.16.</p> <p>Standard: A CROSSWALK STOP ON RED (symbolic circular red) (R10-23) sign (see Section 2B.53) shall be mounted adjacent to a pedestrian hybrid beacon face on each major street approach. If an overhead pedestrian hybrid beacon face is provided, the sign shall be mounted adjacent to the overhead signal face.</p> <p>Option: A Pedestrian (W11-2) warning sign (see Section 2C.50) with an AHEAD (W16-9P) supplemental plaque may be placed in advance of a pedestrian hybrid beacon. A warning beacon may be installed to supplement the W11-2 sign.</p> <p>Guidance: If a warning beacon supplements a W11-2 sign in advance of a pedestrian hybrid beacon, it should be programmed to flash only when the pedestrian hybrid beacon is not in the dark mode.</p>	<p>The committee has a strong objection to using</p>
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<p><b>Section 4F.03 Operation of Pedestrian Hybrid Beacons</b></p> <p>Standard: Pedestrian hybrid beacon indications shall be dark (not illuminated) during periods between actuations.</p> <p>Upon actuation by a pedestrian, a pedestrian hybrid beacon 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 flashing CIRCULAR RED signal indications during the pedestrian clearance interval (see Figure 4F-3). Upon termination of the pedestrian clearance interval, the pedestrian hybrid beacon faces shall revert to a dark (not illuminated) condition.</p> <p>Except as provided in Paragraph 4, the pedestrian signal heads shall continue to display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid beacon 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 beacon faces are displaying steady CIRCULAR RED signal indications. The pedestrian signal heads shall display a flashing</p>	<p><b>Section 4F.03 Operation of Pedestrian Hybrid Beacons</b></p> <p>Standard:</p> <p>01 Pedestrian hybrid beacon indications shall be dark (not illuminated) during periods between actuations.</p> <p>02 Upon actuation by a pedestrian, a pedestrian hybrid beacon 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 flashing CIRCULAR RED signal indications during the pedestrian clearance interval (see Figure 4F-3). Upon termination of the pedestrian clearance interval, the pedestrian hybrid beacon faces shall revert to a dark (not illuminated) condition.</p> <p>03 Except as provided in Paragraph 4, the pedestrian signal heads shall continue to display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid beacon 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 beacon 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</p>	<p>Standard: If a warning beacon is installed to supplement the W11-2 sign, the design and location of the warning beacon shall comply with the provisions of Sections 4L.01 and 4L.03.</p> <p><b>Section 4F.03 Operation of Pedestrian Hybrid Beacons</b></p> <p>Standard: Pedestrian hybrid beacon indications shall be dark (not illuminated) during periods between actuations.</p> <p>Upon actuation by a pedestrian, a pedestrian hybrid beacon 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 flashing CIRCULAR RED signal indications during the pedestrian clearance interval (see Figure 4F-3). Upon termination of the pedestrian clearance interval, the pedestrian hybrid beacon faces shall revert to a dark (not illuminated) condition.</p> <p>Except as provided in Paragraph 4, the pedestrian signal heads shall continue to display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid beacon faces are either dark or displaying flashing or steady CIRCULAR yellow signal indications. The pedestrian signal heads shall display a</p>	<p>“alternating” flashing. It is felt this should be for buses and RR. It has caused confusion when used in St. Cloud</p> <p>The committee made no decision, but thought there may want to be a discussion if it is OK for pedestrians to cross when beacon is black</p>
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<p>UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid beacon faces are displaying alternating 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.</p> <p>Option: Where the pedestrian hybrid beacon is installed adjacent to a roundabout to facilitate crossings by pedestrians with visual disabilities and an engineering study determines that pedestrians without visual disabilities can be allowed to cross the roadway without actuating the pedestrian hybrid beacon, the pedestrian signal heads may be dark (not illuminated) when the pedestrian hybrid beacon faces are dark.</p> <p>Guidance: The duration of the flashing yellow interval should be determined by engineering judgment.</p> <p>Standard: The duration of the steady yellow change interval shall be determined using engineering practices.</p> <p>Guidance: The steady yellow interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches with higher speeds.</p>	<p><b>beacon faces are displaying alternating 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.</b></p> <p>Option: 04 Where the pedestrian hybrid beacon is installed adjacent to a roundabout to facilitate crossings by pedestrians with visual disabilities and an engineering study determines that pedestrians without visual disabilities can be allowed to cross the roadway without actuating the pedestrian hybrid beacon, the pedestrian signal heads may be dark (not illuminated) when the pedestrian hybrid beacon faces are dark.</p> <p>Guidance: 05 <i>The duration of the flashing yellow interval should be determined by engineering judgment.</i></p> <p><b>Standard:</b> 06 <b>The duration of the steady yellow change interval shall be determined using engineering practices.</b></p> <p>Guidance: 07 <i>The steady yellow interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches with higher speeds.</i></p> <p><b>CHAPTER 4G. TRAFFIC CONTROL</b></p>	<p>WALKING PERSON (symbolizing WALK) signal indication when the pedestrian hybrid beacon 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 beacon faces are displaying alternating 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.</p> <p>Option: Where the pedestrian hybrid beacon is installed adjacent to a roundabout to facilitate crossings by pedestrians with visual disabilities and an engineering study determines that pedestrians without visual disabilities can be allowed to cross the roadway without actuating the pedestrian hybrid beacon, the pedestrian signal heads may be dark (not illuminated) when the pedestrian hybrid beacon faces are dark.</p> <p>Guidance: The duration of the flashing yellow interval should be determined by engineering judgment.</p> <p>Standard: The duration of the steady yellow change interval shall be determined using engineering practices.</p> <p>Guidance: The steady yellow interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds (see Section 4D.26). The longer intervals should be</p>	<p>Committee recommends changes per federal manual</p>
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<p><b>4F.4G TRAFFIC CONTROL SIGNALS AND HYBRID BEACPNS FOR EMERGENCY VEHICLE ACCESS</b></p> <p>Section <del>4F.1</del> 4G.1 Applications of Emergency-Vehicle Traffic Control Signals and Hybrid Beacons</p> <p><b>SUPPORT</b> An emergency-vehicle traffic control signal is a special traffic control signal that assigns the right-of-way to an authorized emergency vehicle.</p> <p><b>OPTION</b> An emergency-vehicle traffic control signal may be installed at a location that does not meet other traffic signal warrants such as at an intersection or other location to permit direct access from a building housing the emergency vehicle. An emergency-vehicle hybrid beacon may be installed instead of an emergency-vehicle traffic control signal under conditions described in Section 4G.4</p> <p><b>GUIDANCE</b> If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit <del>reasonably safe</del> the timely entrance of emergency vehicles, or the stopping sight distance for vehicles approaching on the major street is insufficient <del>to permit reasonably safe entrance of</del> for emergency vehicles, installing an emergency-vehicle traffic control signal should be considered. If one of the signal warrants of Chapter 4C is met and a traffic control signal is</p>	<p><b>SIGNALS AND HYBRID BEACONS FOR EMERGENCY-VEHICLE ACCESS</b></p> <p><b>Section 4G.01 Application of Emergency-Vehicle Traffic Control Signals and Hybrid Beacons</b></p> <p>Support:</p> <p>01 An emergency-vehicle traffic control signal is a special traffic control signal that assigns the right-of-way to an authorized emergency vehicle.</p> <p>Option:</p> <p>02 An emergency-vehicle traffic control signal may be installed at a location that does not meet other traffic signal warrants such as at an intersection or other location to permit direct access from a building housing the emergency vehicle.</p> <p>03 An emergency-vehicle hybrid beacon may be installed instead of an emergency-vehicle traffic control signal under conditions described in Section 4G.04.</p> <p><i>Guidance:</i></p> <p>04 <i>If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit the timely entrance of emergency vehicles, or the stopping sight distance for vehicles approaching on the major street is insufficient for emergency vehicles, installing an emergency-vehicle traffic control signal should be considered. If one of the signal warrants of Chapter 4C is met and a traffic control signal is justified by an engineering study, and if a decision is made to install a traffic control signal, it should be installed based upon the provisions of Chapter 4D.</i></p>	<p>reserved for use on approaches with higher speeds.</p> <p>4G TRAFFIC CONTROL SIGNALS AND HYBRID BEACPNS FOR EMERGENCY VEHICLE ACCESS</p> <p>Section 4G.1 Applications of Emergency-Vehicle Traffic Control Signals and Hybrid Beacons</p> <p><b>SUPPORT</b> An emergency-vehicle traffic control signal is a special traffic control signal that assigns the right-of-way to an authorized emergency vehicle.</p> <p><b>OPTION</b> An emergency-vehicle traffic control signal may be installed at a location that does not meet other traffic signal warrants such as at an intersection or other location to permit direct access from a building housing the emergency vehicle. An emergency-vehicle hybrid beacon may be installed instead of an emergency-vehicle traffic control signal under conditions described in Section 4G.4</p> <p><b>GUIDANCE</b> If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit the timely entrance of emergency vehicles, or the</p>	<p>Recommend making changes</p>
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<p>justified by an engineering study, and if a decision is made to install a traffic control signal, it should be installed based upon the provisions of Chapter 4D. The sight distance determination should be based on the location of the visibility obstruction for the critical approach lane for each street or drive and the posted or statutory speed limit or 85<sup>th</sup>-percentile speed on the major street, whichever is higher.</p> <p><del>4F.2</del> 4G.2 Design of Emergency-Vehicle Traffic Control Signals STANDARD</p> <p>Except as <del>otherwise specified</del> provided in this Section, an emergency-vehicle traffic control signal shall meet the requirements of this Manual.</p> <p>An Emergency Vehicle (W11-8) sign (see Section 2C.<del>40</del>49) with an EMERGENCY SIGNAL AHEAD (W11-12p) supplemental plaque shall be placed in advance of all emergency-vehicle traffic control signals.</p> <p>If a warning beacon is installed to supplement the W11-8 sign, the design and location of the beacon shall <del>conform to</del> comply with the Standards <del>specified in</del> of Sections <del>4K.1</del> 4L.1 and <del>4K.3</del> 4L.3.</p> <p>GUIDANCE</p> <p>At least one of the two required signal faces for each approach on the major street should be located over the roadway.</p> <p>The following size signal <del>lenses</del> indications</p>	<p><i>05 The sight distance determination should be based on the location of the visibility obstruction for the critical approach lane for each street or drive and the posted or statutory speed limit or 85th-percentile speed on the major street, whichever is higher.</i></p> <p><b>Section 4G.02 Design of Emergency-Vehicle Traffic Control Signals Standard:</b></p> <p><b>01 Except as otherwise provided in this Section, an emergency-vehicle traffic control signal shall meet the requirements of this Manual.</b></p> <p><b>02 An Emergency Vehicle (W11-8) sign (see Section 2C.49) with an EMERGENCY SIGNAL AHEAD (W11-12P) supplemental plaque shall be placed in advance of all emergency-vehicle traffic control signals. If a warning beacon is installed to supplement the W11-8 sign, the design and location of the beacon shall comply with the Standards of Sections 4L.01 and 4L.03.</b></p> <p><i>Guidance:</i></p> <p><i>03 At least one of the two required signal faces for each approach on the major street should be located over the roadway.</i></p> <p><i>04 The following size signal indications should be used for emergency-vehicle traffic control signals: 12-inch diameter for steady red and steady yellow circular signal indications and any arrow indications, and 8-inch diameter for green or flashing yellow circular signal</i></p>	<p>stopping sight distance for vehicles approaching on the major street is insufficient for emergency vehicles, installing an emergency-vehicle traffic control signal should be considered. If one of the signal warrants of Chapter 4C is met and a traffic control signal is justified by an engineering study, and if a decision is made to install a traffic control signal, it should be installed based upon the provisions of Chapter 4D. The sight distance determination should be based on the location of the visibility obstruction for the critical approach lane for each street or drive and the posted or statutory speed limit or 85<sup>th</sup>-percentile speed on the major street, whichever is higher.</p> <p>4G.2 Design of Emergency-Vehicle Traffic Control Signals STANDARD</p> <p>Except as otherwise provided in this Section, an emergency-vehicle traffic control signal shall meet the requirements of this Manual.</p> <p>An Emergency Vehicle (W11-8) sign (see Section 2C.49) with an EMERGENCY SIGNAL AHEAD (W11-12p) supplemental plaque shall be placed in advance of all emergency-vehicle traffic control signals.</p> <p>If a warning beacon is installed to supplement the W11-8 sign, the design and location of the beacon shall comply with the Standards of Sections 4L.1 and 4L.3.</p> <p>GUIDANCE</p>	
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<p>should be used for emergency-vehicle traffic control signals: 300 mm (12 in) diameter for <b>steady red</b> and steady yellow <b>circular</b> signal indications <b>and any arrow indications</b>, and 200 mm (8 in) diameter for <b>green or flashing yellow or steady green circular</b> signal indications.</p> <p><b>STANDARD</b></p> <p>An EMERGENCY SIGNAL (R10-13) sign shall be mounted adjacent to a signal face on each major street approach (see Section 2B.45). If an overhead signal face is provided, the EMERGENCY SIGNAL sign shall be mounted adjacent to the overhead signal face.</p> <p><b>OPTION</b></p> <p>An approach that only serves emergency vehicles may be provided with only one signal face consisting of one or more signal sections.</p> <p>Besides using a 200 mm (8 in) diameter signal indication, other appropriate means to reduce the flashing yellow light output may be used.</p> <p><b>4F4G.3 Operation of Emergency-Vehicle Traffic Control Signals</b></p> <p><b>STANDARD</b></p> <p>Right-of-way for emergency vehicles at signalized locations operating in the steady (stop-and-go) mode shall be obtained as <b>specified provided</b> in Section 4D.1327. As a minimum, the signal indications, sequence, and manner of operation of an emergency-vehicle traffic control signal</p>	<p><i>indications.</i></p> <p><b>Standard:</b></p> <p>05 <b>An EMERGENCY SIGNAL (R10-13) sign shall be mounted adjacent to a signal face on each major street approach (see Section 2B.53). If an overhead signal face is provided, the EMERGENCY SIGNAL sign shall be mounted adjacent to the overhead signal face.</b></p> <p><b>Option:</b></p> <p>06 An approach that only serves emergency vehicles may be provided with only one signal face consisting of one or more signal sections.</p> <p>07 Besides using an 8-inch diameter signal indication, other appropriate means to reduce the flashing yellow light output may be used.</p> <p><b>Section 4G.03 Operation of Emergency-Vehicle Traffic Control Signals</b></p> <p><b>Standard:</b></p> <p>01 <b>Right-of-way for emergency vehicles at signalized locations operating in the steady (stop-and-go) mode shall be obtained as provided in Section 4D.27.</b></p> <p>02 <b>As a minimum, the signal indications, sequence, and manner of operation of an emergency-vehicle traffic control signal installed at a midblock location shall be as follows:</b></p>	<p>At least one of the two required signal faces for each approach on the major street should be located over the roadway.</p> <p>The following size signal indications should be used for emergency-vehicle traffic control signals: 300 mm (12 in) diameter for steady red and steady yellow circular signal indications and any arrow indications, and 200 mm (8 in) diameter for green or flashing yellow circular signal indications.</p> <p><b>STANDARD</b></p> <p>An EMERGENCY SIGNAL (R10-13) sign shall be mounted adjacent to a signal face on each major street approach (see Section 2B.45). If an overhead signal face is provided, the EMERGENCY SIGNAL sign shall be mounted adjacent to the overhead signal face.</p> <p><b>OPTION</b></p> <p>An approach that only serves emergency vehicles may be provided with only one signal face consisting of one or more signal sections.</p> <p>Besides using a 200 mm (8 in) diameter signal indication, other appropriate means to reduce the flashing yellow light output may be used.</p> <p><b>4G.3 Operation of Emergency-Vehicle Traffic Control Signals</b></p> <p><b>STANDARD</b></p> <p>Right-of-way for emergency vehicles at signalized locations operating in the steady</p>	<p>Recommend making changes</p>
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<p>installed at a midblock location shall be as follows:</p> <p>A. The signal indication, between emergency-vehicle actuations, shall be either <b>steady</b> green or flashing yellow. If the flashing yellow signal indication is used instead of the <b>steady</b> green signal indication, it shall be displayed in the normal position of the <b>steady</b> green signal indication, while then <b>steady</b> red and steady yellow signal indications shall be displayed in their normal positions.</p> <p>B. When an emergency vehicle actuation occurs, a steady yellow change interval followed by a steady red interval shall be displayed to traffic on the major street.</p> <p>C. A yellow change interval is not required following the green interval for the emergency-vehicle driveway.</p> <p>Emergency-vehicle traffic control signals located at intersections shall either be operated in the flashing mode between emergency-vehicle actuations (see Sections 4D.28 and 4D.30) or be fully - actuated or semi-traffic actuated; to accommodate normal vehicular and pedestrian traffic on the streets.</p> <p>Warning beacons, if used with an emergency-vehicle traffic control signal, shall be flashed only:</p> <p>A. For an appropriate time in advance of and during the steady yellow change interval for the major street; and</p> <p>B. During the steady red interval for the major street.</p> <p><b>GUIDANCE</b> The duration of the <b>steady</b> red interval for traffic on the major street should be determined by on-site test-run time studies, but should not</p>	<p><b>A. The signal indication, between emergency-vehicle actuations, shall be either green or flashing yellow. If the flashing yellow signal indication is used instead of the green signal indication, it shall be displayed in the normal position of the green signal indication, while the steady red and steady yellow signal indications shall be displayed in their normal positions.</b></p> <p><b>B. When an emergency-vehicle actuation occurs, a steady yellow change interval followed by a steady red interval shall be displayed to traffic on the major street.</b></p> <p><b>C. A yellow change interval is not required following the green interval for the emergency-vehicle driveway.</b></p> <p><sup>03</sup> <b>Emergency-vehicle traffic control signals located at intersections shall either be operated in the flashing mode between emergency-vehicle actuations (see Sections 4D.28 and 4D.30) or be full-actuated or semi-actuated to accommodate normal vehicular and pedestrian traffic on the streets.</b></p> <p><sup>04</sup> <b>Warning beacons, if used with an emergency-vehicle traffic control signal, shall be flashed only:</b></p> <p><b>A. For an appropriate time in advance of and during the steady yellow change interval for the major street; and</b></p> <p><b>B. During the steady red interval for the major street.</b></p> <p><i>Guidance:</i></p> <p><sup>05</sup> <i>The duration of the steady red interval for traffic on the major street should be determined by on-site test-run time studies, but should not exceed 1.5 times the time required for the emergency vehicle to clear the path of conflicting vehicles.</i></p> <p>Option:</p>	<p>(stop-and-go) mode shall be obtained as provided in Section 4D.27.</p> <p>As a minimum, the signal indications, sequence, and manner of operation of an emergency-vehicle traffic control signal installed at a midblock location shall be as follows:</p> <p>A. The signal indication, between emergency-vehicle actuations, shall be either green or flashing yellow. If the flashing yellow signal indication is used instead of the green signal indication, it shall be displayed in the normal position of the green signal indication, while then steady red and steady yellow signal indications shall be displayed in their normal positions.</p> <p>B. When an emergency vehicle actuation occurs, a steady yellow change interval followed by a steady red interval shall be displayed to traffic on the major street.</p> <p>C. A yellow change interval is not required following the green interval for the emergency-vehicle driveway.</p> <p>Emergency-vehicle traffic control signals located at intersections shall either be operated in the flashing mode between emergency-vehicle actuations (see Sections 4D.28 and 4D.30) or be full-actuated or semi actuated to accommodate normal vehicular and pedestrian traffic on the streets.</p> <p>Warning beacons, if used with an emergency-vehicle traffic control signal, shall be flashed only:</p> <p>A. For an appropriate time in advance of and during the steady yellow change interval for the major street; and</p> <p>B. During the steady red interval for the major street.</p>	<p>Recommend changes with exceptions below</p>
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<p>exceed 1.5 times the time required for the emergency vehicle to clear the path of conflicting vehicles.</p> <p><b>OPTION</b></p> <p>An emergency-vehicle traffic control signal sequence may be initiated manually from a local control point such as a fire station or law enforcement headquarters or from an emergency vehicle equipped for remote operation of the signal.</p> <p><b>Section 4G.04 Emergency-Vehicle Hybrid Beacons</b></p> <p><b>Standard:</b></p> <p>Emergency-vehicle hybrid beacons shall be used only in conjunction with signs to warn and control traffic at an unsignalized location where emergency vehicles enter or cross a street or highway. Emergency-vehicle hybrid beacons shall be actuated only by authorized emergency or maintenance personnel.</p> <p><b>Guidance:</b></p> <p>Emergency-vehicle hybrid beacons should only be used when all of the following criteria are satisfied:</p> <p>A. The conditions justifying an emergency-vehicle traffic control signal (see Section 4G.01) are met; and</p> <p>B. An engineering study, considering the road width, approach speeds, and other pertinent factors, determines that emergency-vehicle hybrid beacons can be designed and located in compliance with the requirements contained in</p>	<p>06 An emergency-vehicle traffic control signal sequence may be initiated manually from a local control point such as a fire station or law enforcement headquarters or from an emergency vehicle equipped for remote operation of the signal.</p> <p><b>Section 4G.04 Emergency-Vehicle Hybrid Beacons</b></p> <p><b>Standard:</b></p> <p>01 <b>Emergency-vehicle hybrid beacons shall be used only in conjunction with signs to warn and control traffic at an unsignalized location where emergency vehicles enter or cross a street or highway. Emergency-vehicle hybrid beacons shall be actuated only by authorized emergency or maintenance personnel.</b></p> <p><i>Guidance:</i></p> <p>02 <i>Emergency-vehicle hybrid beacons should only be used when all of the following criteria are satisfied:</i></p> <p><i>A. The conditions justifying an emergency-vehicle traffic control signal (see Section 4G.01) are met; and</i></p> <p><i>B. An engineering study, considering the road width, approach speeds, and other pertinent factors, determines that emergency-vehicle hybrid beacons can be designed and located in compliance with the requirements contained in this Section and in Section 4L.01, such that they effectively warn and control traffic at the</i></p>	<p><b>GUIDANCE</b></p> <p>The duration of the steady red interval for traffic on the major street should be determined by on-site test-run time studies, but should not exceed 1.5 times the time required for the emergency vehicle to clear the path of conflicting vehicles.</p> <p><b>OPTION</b></p> <p>An emergency-vehicle traffic control signal sequence may be initiated manually from a local control point such as a fire station or law enforcement headquarters or from an emergency vehicle equipped for remote operation of the signal.</p> <p><b>Section 4G.04 Emergency-Vehicle Hybrid Beacons</b></p> <p><b>Standard:</b></p> <p>Emergency-vehicle hybrid beacons shall be used only in conjunction with signs to warn and control traffic at an unsignalized location where emergency vehicles enter or cross a street or highway. Emergency-vehicle hybrid beacons shall be actuated only by authorized emergency or maintenance personnel.</p> <p><b>Guidance:</b></p> <p>Emergency-vehicle hybrid beacons should only be used when all of the following criteria are satisfied:</p> <p>A. The conditions justifying an emergency-vehicle traffic control signal (see Section 4G.01) are met; and</p> <p>B. An engineering study, considering the road</p>	<p>Remove language regarding being near intersection</p>
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<p>this Section and in Section 4L.01, such that they effectively warn and control traffic at the location; and</p> <p><del>C. The location is not at or within 100 feet from an intersection or driveway where the side road or driveway is controlled by a STOP or YIELD sign.</del></p> <p>Standard: Except as otherwise provided in this Section, an emergency-vehicle hybrid beacon shall meet the requirements of this Manual.</p> <p>An emergency-vehicle hybrid beacon face shall consist of three signal sections, with a CIRCULAR YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal indications (see Figure 4G-1).</p> <p>Emergency-vehicle hybrid beacons shall be placed in a dark mode (no indications displayed) during periods between actuations.</p> <p>Upon actuation by authorized emergency personnel, the emergency-vehicle hybrid beacon faces shall each display a flashing yellow signal indication, followed by a steady yellow change interval, prior to displaying two CIRCULAR RED signal indications in an <b>alternating</b> flashing array for a duration of time adequate for egress of the emergency vehicles. The <b>alternating</b> 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. Upon termination of the flashing red signal indications, the emergency-vehicle hybrid beacons shall revert to a dark mode (no</p>	<p><i>location; and</i></p> <p><i>C. The location is not at or within 100 feet from an intersection or driveway where the side road or driveway is controlled by a STOP or YIELD sign.</i></p> <p><b>Standard:</b></p> <p><b>03 Except as otherwise provided in this Section, an emergency-vehicle hybrid beacon shall meet the requirements of this Manual.</b></p> <p><b>04 An emergency-vehicle hybrid beacon face shall consist of three signal sections, with a CIRCULAR YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal indications (see Figure 4G-1).</b></p> <p><b>05 Emergency-vehicle hybrid beacons shall be placed in a dark mode (no indications displayed) during periods between actuations.</b></p> <p><b>06 Upon actuation by authorized emergency personnel, the emergency-vehicle hybrid beacon faces shall each display a flashing yellow signal indication, followed by a steady yellow change interval, prior to displaying two CIRCULAR RED signal indications in an alternating flashing array for a duration of time adequate for egress of the emergency vehicles. The alternating 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. Upon termination of the flashing red signal indications, the emergency-vehicle hybrid beacons shall revert to a dark mode (no indications displayed) condition.</b></p> <p><i>Guidance:</i></p> <p><i>07 The duration of the flashing yellow interval</i></p>	<p>width, approach speeds, and other pertinent factors, determines that emergency-vehicle hybrid beacons can be designed and located in compliance with the requirements contained in this Section and in Section 4L.01, such that they effectively warn and control traffic at the location; and</p> <p>Standard: Except as otherwise provided in this Section, an emergency-vehicle hybrid beacon shall meet the requirements of this Manual.</p> <p>An emergency-vehicle hybrid beacon face shall consist of three signal sections, with a CIRCULAR YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal indications (see Figure 4G-1).</p> <p>Emergency-vehicle hybrid beacons shall be placed in a dark mode (no indications displayed) during periods between actuations.</p> <p>Upon actuation by authorized emergency personnel, the emergency-vehicle hybrid beacon faces shall each display a flashing yellow signal indication, followed by a steady yellow change interval, prior to displaying two CIRCULAR RED signal indications in an alternating flashing array for a duration of time adequate for egress of the emergency vehicles. The alternating 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. Upon termination of the flashing red signal indications, the emergency-vehicle hybrid beacons shall revert to a dark mode (no</p>	<p>Committee objects to the use of “alternating”</p>
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<p>indications displayed) condition.</p> <p>Guidance: The duration of the flashing yellow interval should be determined by engineering judgment.</p> <p>Standard: The duration of the steady yellow change interval shall be determined using engineering practices.</p> <p>Guidance: The steady yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches with higher speeds.</p> <p>Option: A steady red clearance interval may be used after the steady yellow change interval.</p> <p>Emergency-vehicle hybrid beacons may be equipped with a light or other display visible to the operator of the egressing emergency vehicle to provide confirmation that the beacons are operating.</p> <p>Emergency-vehicle hybrid beacons may be supplemented with an advance warning sign, which may also be supplemented with a Warning Beacon (see Section 4L.03).</p> <p>Guidance: If a Warning Beacon is used to supplement the advance warning sign, it should be programmed to flash only when the emergency-vehicle hybrid beacon is not in the</p>	<p><i>should be determined by engineering judgment.</i></p> <p><b>Standard:</b> 08 <b>The duration of the steady yellow change interval shall be determined using engineering practices.</b></p> <p><i>Guidance:</i> 09 <i>The steady yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches with higher speeds.</i></p> <p><b>Option:</b> 10 A steady red clearance interval may be used after the steady yellow change interval. 11 Emergency-vehicle hybrid beacons may be equipped with a light or other display visible to the operator of the egressing emergency vehicle to provide confirmation that the beacons are operating. 12 Emergency-vehicle hybrid beacons may be supplemented with an advance warning sign, which may also be supplemented with a Warning Beacon (see Section 4L.03).</p> <p><i>Guidance:</i> 13 <i>If a Warning Beacon is used to supplement the advance warning sign, it should be programmed to flash only when the emergency-vehicle hybrid beacon is not in the dark mode.</i></p> <p><b>Standard:</b> 14 <b>At least two emergency-vehicle hybrid beacon faces shall be installed for each approach of the major street and a stop line shall be installed for each approach of the major street.</b></p> <p><i>Guidance:</i> 15 <i>On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 40 mph, and on approaches having traffic or</i></p>	<p>indications displayed) condition.</p> <p>Guidance: The duration of the flashing yellow interval should be determined by engineering judgment.</p> <p>Standard: The duration of the steady yellow change interval shall be determined using engineering practices.</p> <p>Guidance: The steady yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches with higher speeds.</p> <p>Option: A steady red clearance interval may be used after the steady yellow change interval.</p> <p>Emergency-vehicle hybrid beacons may be equipped with a light or other display visible to the operator of the egressing emergency vehicle to provide confirmation that the beacons are operating.</p> <p>Emergency-vehicle hybrid beacons may be supplemented with an advance warning sign, which may also be supplemented with a Warning Beacon (see Section 4L.03).</p> <p>Guidance: If a Warning Beacon is used to supplement the advance warning sign, it should be programmed to flash only when the emergency-vehicle hybrid beacon is not in the</p>	
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<p>dark mode.</p> <p><b>Standard:</b> At least two emergency-vehicle hybrid beacon faces shall be installed for each approach of the major street and a stop line shall be installed for each approach of the major street.</p> <p><b>Guidance:</b> On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 40 mph, and on approaches having traffic or operating conditions that would tend to obscure visibility of roadside beacon faces, both of the minimum of two emergency-vehicle hybrid beacon faces should be installed over the roadway.</p> <p>On multi-lane approaches having posted or statutory speed limits or 85th-percentile speeds of 40 mph or less, either an emergency-vehicle hybrid beacon face should be installed on each side of the approach (if a median of sufficient width exists) or at least one of the emergency-vehicle hybrid beacon faces should be installed over the roadway.</p> <p>An emergency-vehicle hybrid beacon should comply with the signal face location provisions described in Sections 4D.11 through 4D.16.</p> <p><b>Standard:</b> Stop lines and EMERGENCY SIGNAL—STOP WHEN FLASHING RED (R10-14 or R10-14a) signs (see Section 2B.53) shall be used with emergency-vehicle hybrid beacons.</p> <p><b>Option:</b> If needed for extra emphasis, a STOP HERE ON FLASHING RED (R10-14b) sign (see</p>	<p><i>operating conditions that would tend to obscure visibility of roadside beacon faces, both of the minimum of two emergency-vehicle hybrid beacon faces should be installed over the roadway.</i></p> <p><i>16 On multi-lane approaches having posted or statutory speed limits or 85th-percentile speeds of 40 mph or less, either an emergency-vehicle hybrid beacon face should be installed on each side of the approach (if a median of sufficient width exists) or at least one of the emergency-vehicle hybrid beacon faces should be installed over the roadway.</i></p> <p><i>17 An emergency-vehicle hybrid beacon should comply with the signal face location provisions described in Sections 4D.11 through 4D.16.</i></p> <p><b>Standard:</b> <b>18 Stop lines and EMERGENCY SIGNAL—STOP WHEN FLASHING RED (R10-14 or R10-14a) signs (see Section 2B.53) shall be used with emergency-vehicle hybrid beacons.</b></p> <p><b>Option:</b> 19 If needed for extra emphasis, a STOP HERE ON FLASHING RED (R10-14b) sign (see Section 2B.53) may be installed with an emergency-vehicle hybrid beacon.</p>	<p>dark mode.</p> <p><b>Standard:</b> At least two emergency-vehicle hybrid beacon faces shall be installed for each approach of the major street and a stop line shall be installed for each approach of the major street.</p> <p><b>Guidance:</b> On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 40 mph, and on approaches having traffic or operating conditions that would tend to obscure visibility of roadside beacon faces, both of the minimum of two emergency-vehicle hybrid beacon faces should be installed over the roadway.</p> <p>On multi-lane approaches having posted or statutory speed limits or 85th-percentile speeds of 40 mph or less, either an emergency-vehicle hybrid beacon face should be installed on each side of the approach (if a median of sufficient width exists) or at least one of the emergency-vehicle hybrid beacon faces should be installed over the roadway.</p> <p>An emergency-vehicle hybrid beacon should comply with the signal face location provisions described in Sections 4D.11 through 4D.16.</p> <p><b>Standard:</b> Stop lines and EMERGENCY SIGNAL—STOP WHEN FLASHING RED (R10-14 or R10-14a) signs (see Section 2B.53) shall be used with emergency-vehicle hybrid beacons.</p> <p><b>Option:</b> If needed for extra emphasis, a STOP HERE ON FLASHING RED (R10-14b) sign (see</p>	<p>Recommend changes</p>
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<p>Section 2B.53) may be installed with an emergency-vehicle hybrid beacon.</p> <p>CHAPTER <del>4G.</del>4H TRAFFIC CONTROL SIGNALS FOR ONE-LANE, TWO-WAY FACILITIES</p> <p>Section <del>4G.1</del> 4H.1 Application of Traffic Control Signals for One-Lane, Two-Way Facilities</p> <p>SUPPORT A traffic control signal at a narrow bridge, tunnel, or roadway section is a special signal that assigns the right-of-way for vehicles passing over a bridge or through a tunnel or roadway section that is not of sufficient width for two opposing vehicles to pass <del>reasonably safely</del>.</p> <p>Temporary traffic control signals (see Sections 4D.20 and 6F.80) are the most frequent application of one lane, two-way facilities.</p> <p>GUIDANCE Sight distance across or through the one-lane, two-way facility should be considered as well as the approach speed and sight distance approaching the facility when determining whether traffic control signals should be installed.</p> <p>OPTION At a narrow bridge, tunnel, or roadway section where a traffic control signal is not justified under the conditions of Chapter 4C, a traffic control signal may be used if gaps in opposing traffic do not permit the <del>reasonably safe</del> flow</p>	<p><b>CHAPTER 4H. TRAFFIC CONTROL SIGNALS FOR ONE-LANE, TWO-WAY FACILITIES</b></p> <p><b>Section 4H.01 Application of Traffic Control Signals for One-Lane, Two-Way Facilities</b></p> <p>Support:</p> <p>01 A traffic control signal at a narrow bridge, tunnel, or roadway section is a special signal that assigns the right-of-way for vehicles passing over a bridge or through a tunnel or roadway section that is not of sufficient width for two opposing vehicles to pass.</p> <p>02 Temporary traffic control signals (see Sections 4D.32 and 6F.84) are the most frequent application of one-lane, two-way facilities.</p> <p><i>Guidance:</i></p> <p>03 <i>Sight distance across or through the one-lane, two-way facility should be considered as well as the approach speed and sight distance approaching the facility when determining whether traffic control signals should be installed.</i></p> <p>Option:</p> <p>04 At a narrow bridge, tunnel, or roadway section where a traffic control signal is not justified under the conditions of Chapter 4C, a traffic control signal may be used if gaps in opposing traffic do not permit the flow of traffic through the one-lane section of roadway.</p>	<p>Section 2B.53) may be installed with an emergency-vehicle hybrid beacon.</p> <p>CHAPTER 4H TRAFFIC CONTROL SIGNALS FOR ONE-LANE, TWO-WAY FACILITIES</p> <p>Section 4H.1 Application of Traffic Control Signals for One-Lane, Two-Way Facilities</p> <p>SUPPORT A traffic control signal at a narrow bridge, tunnel, or roadway section is a special signal that assigns the right-of-way for vehicles passing over a bridge or through a tunnel or roadway section that is not of sufficient width for two opposing vehicles to pass.</p> <p>Temporary traffic control signals (see Sections 4D.20 and 6F.80) are the most frequent application of one lane, two-way facilities.</p> <p>GUIDANCE Sight distance across or through the one-lane, two-way facility should be considered as well as the approach speed and sight distance approaching the facility when determining whether traffic control signals should be installed.</p> <p>OPTION At a narrow bridge, tunnel, or roadway section where a traffic control signal is not justified under the conditions of Chapter 4C, a traffic</p>	<p>No change</p>
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<p>of traffic through the one-lane section of roadway.</p> <p><del>4G.2</del> <b>4H.2</b> Design of Traffic Control Signals for One-Lane, Two-Way Facilities</p> <p><b>STANDARD</b> The provisions of Chapter 4D shall apply to traffic control signals for one-lane, two-way facilities, except that:</p> <p>A. Durations of red clearance intervals shall be adequate to clear the one-lane section of conflicting vehicles.</p> <p>B. Adequate means, such as interconnection, shall be provided to prevent conflicting signal indications, such as green and green, at opposite ends of the section.</p> <p><del>4G.3</del> <b>4H.3</b> Operation of Traffic Control Signals for One-Lane, Two-Way Facilities</p> <p><b>STANDARD</b> Traffic control signals at one-lane, two-way facilities shall operate in a manner consistent with traffic requirements. When in the flashing mode, the signal indications shall flash red.</p> <p><b>GUIDANCE</b> Adequate time should be provided to allow traffic to clear the narrow facility before opposing traffic is allowed to move. Engineering judgment should be used to determine the proper timing for the signal.</p>	<p><b>Section 4H.02 Design of Traffic Control Signals for One-Lane, Two-Way Facilities</b> <b>Standard:</b> 01 <b>The provisions of Chapter 4D shall apply to traffic control signals for one-lane, two-way facilities, except that:</b></p> <p><b>A. Durations of red clearance intervals shall be adequate to clear the one-lane section of conflicting vehicles.</b></p> <p><b>B. Adequate means, such as interconnection, shall be provided to prevent conflicting signal indications, such as green and green, at opposite ends of the section.</b></p> <p><b>Section 4H.03 Operation of Traffic Control Signals for One-Lane, Two-Way Facilities</b> <b>Standard:</b> 01 <b>Traffic control signals at one-lane, two-way facilities shall operate in a manner consistent with traffic requirements.</b> 02 <b>When in the flashing mode, the signal indications shall flash red.</b></p> <p><i>Guidance:</i> 03 <i>Adequate time should be provided to allow traffic to clear the narrow facility before opposing traffic is allowed to move. Engineering judgment should be used to determine the proper timing for the signal.</i></p>	<p>control signal may be used if gaps in opposing traffic do not permit the flow of traffic through the one-lane section of roadway.</p> <p>4H.2 Design of Traffic Control Signals for One-Lane, Two-Way Facilities</p> <p><b>STANDARD</b> The provisions of Chapter 4D shall apply to traffic control signals for one-lane, two-way facilities, except that:</p> <p>A. Durations of red clearance intervals shall be adequate to clear the one-lane section of conflicting vehicles.</p> <p>B. Adequate means, such as interconnection, shall be provided to prevent conflicting signal indications, such as green and green, at opposite ends of the section.</p> <p>4H.3 Operation of Traffic Control Signals for One-Lane, Two-Way Facilities</p> <p><b>STANDARD</b> Traffic control signals at one-lane, two-way facilities shall operate in a manner consistent with traffic requirements. When in the flashing mode, the signal indications shall flash red.</p> <p><b>GUIDANCE</b> Adequate time should be provided to allow traffic to clear the narrow facility before opposing traffic is allowed to move.</p>	<p>No change</p> <p>Recommend changing per federal manual</p>
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CHAPTER ~~4H.~~ 4I TRAFFIC CONTROL SIGNALS FOR FREEWAY ENTRANCE RAMPS

~~4H.1~~ 4H.1 Application of Freeway Entrance Ramp Control Signals

SUPPORT

Ramp control signals are traffic control signals that control the flow of traffic entering the freeway facility. This is often referred to as “ramp metering”

Freeway entrance ramp control signals are sometimes used if controlling traffic entering the freeway could reduce the total expected delay to traffic in the freeway corridor, including freeway ramps and local streets, ~~and if at least one of the following conditions is present:~~

~~A. Congestion recurs on the freeway because traffic demand is in excess of the capacity, or congestion recurs or a high frequency of crashes exist at the freeway entrance because of inadequate ramp merging area. A good indicator of recurring freeway congestion is freeway operating speeds less than 80 km/h (50 mph) occurring regularly for at least a half-hour period. Freeway operating speeds less than 50 km/h (30 mph) for a half hour period or more would indicate severe congestion.~~

~~B. Controlling traffic entering a freeway assists in meeting local transportation system management objectives identified for freeway traffic flow, such as the following:~~

~~1. Maintenance of a specific freeway level of service.~~

CHAPTER 4I. TRAFFIC CONTROL SIGNALS FOR FREEWAY ENTRANCE RAMPS

Section 4I.01 Application of Freeway Entrance Ramp Control Signals

Support:

01 Ramp control signals are traffic control signals that control the flow of traffic entering the freeway facility.

This is often referred to as “ramp metering.”

02 Freeway entrance ramp control signals are sometimes used if controlling traffic entering the freeway could reduce the total expected delay to traffic in the freeway corridor, including freeway ramps and local streets.

Guidance:

03 *The installation of ramp control signals should be preceded by an engineering study of the physical and traffic conditions on the highway facilities likely to be affected. The study should include the ramps and ramp connections and the surface streets that would be affected by the ramp control, as well as the freeway section concerned.*

Support:

04 Information on conditions that might justify freeway entrance ramp control signals, factors to be evaluated in traffic engineering studies for ramp control signals, design of ramp control signals, and operation of ramp control signals can be found in the FHWA’s “Ramp Management and Control Handbook” (see Section 1A.11).

Engineering judgment should be used to determine the proper timing for the signal.

CHAPTER 4I TRAFFIC CONTROL SIGNALS FOR FREEWAY ENTRANCE RAMPS

4H.1 Application of Freeway Entrance Ramp Control Signals

SUPPORT

Ramp control signals are traffic control signals that control the flow of traffic entering the freeway facility. This is often referred to as “ramp metering”

Freeway entrance ramp control signals are sometimes used if controlling traffic entering the freeway could reduce the total expected delay to traffic in the freeway corridor, including freeway ramps and local streets

GUIDANCE

The installation of ramp control signals should be preceded by an engineering study of the physical and traffic conditions on the highway facilities likely to be affected. The study should include the ramps and ramp connections and the surface streets that would be affected by the ramp control, as well as the freeway section concerned.

Support:

Information on conditions that might justify freeway entrance ramp control signals, factors

- ~~2. Priority treatments with higher levels of service for mass transit and carpools.~~
- ~~3. Redistribution of freeway access demand to other on ramps.~~
- ~~C. Predictable, sporadic congestion occurs on isolated sections of freeway because of short-period peak traffic loads from special events or from severe peak loads of recreational traffic.~~

**GUIDANCE**

The installation of ramp control signals should be preceded by an engineering study of the physical and traffic conditions on the highway facilities likely to be affected. The study should include the ramps and ramp connections and the surface streets that would be affected by the ramp control, as well as the freeway section concerned. ~~Types of traffic data that should be obtained include, but are not limited to, traffic volumes, traffic crashes, freeway operating speeds, and travel time and delay on the freeway, approaches, ramps, and alternate surface routes.~~

~~Capacities and demand/capacity relationships should be determined for each freeway section. The locations and causes of capacity restrictions and those sections where demand exceeds capacity should be identified. From these and other data, estimates should be made of desirable metering rates, probable reductions in the delay of freeway traffic, likely increases in delay to ramp traffic, and the potential impact on surface streets. The study should include an evaluation of the ramp's storage capacities for vehicles delayed at the signal, the impact of queued traffic on the local street intersection, and the availability of suitable alternate surface routes having adequate capacity to accommodate any additional traffic volume.~~

to be evaluated in traffic engineering studies for ramp control signals, design of ramp control signals, and operation of ramp control signals can be found in the FHWA's "Ramp Management and Control Handbook" (see Section 1A.11).

<p><del>Before installing ramp control signals, consideration should be given to their potential acceptance by the public and the requirements for enforcing ramp control, as well as alternate means of increasing the capacity, reducing the demand, or improving the characteristics of the freeway.</del></p> <p>Support: Information on conditions that might justify freeway entrance ramp control signals, factors to be evaluated in traffic engineering studies for ramp control signals, design of ramp control signals, and operation of ramp control signals can be found in the FHWA’s “Ramp Management and Control Handbook” (see Section 1A.11).</p> <p><del>4H.2</del> 4I.2 Design of Freeway Entrance Ramp Control Signals</p> <p><b>STANDARD</b> Ramp control signals shall meet all of the standard design specifications for traffic control signals, except as <del>otherwise noted provided herein:</del> in this Section.</p> <p><del>A.</del> The signal face for freeway entrance ramp control signals shall be either a two-<del>lens</del> section signal face containing red and green signal <del>lenses</del> indications or a three-<del>lens</del> section signal face containing red, yellow, and green signal <del>lenses</del> indications.</p> <p><del>B.</del> 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</p>	<p><b>Section 4I.02 Design of Freeway Entrance Ramp Control Signals Standard:</b></p> <p>01 <b>Ramp control signals shall meet all of the standard design specifications for traffic control signals, except as otherwise provided in this Section.</b></p> <p>02 <b>The signal face for freeway entrance ramp control signals shall be either a two-section signal face containing red and green signal indications or a three-section signal face containing red, yellow, and green signal indications.</b></p> <p>03 <b>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</b></p>	<p>4I.2 Design of Freeway Entrance Ramp Control Signals</p> <p><b>STANDARD</b> Ramp control signals shall meet all of the standard design specifications for traffic control signals, except as otherwise provided in this Section.</p> <p>The signal face for freeway entrance ramp control signals shall be either a two section signal face containing red and green signal</p>	<p>Recommend changes with notes below</p> <p>New federal language per interpretation dated 1/5/2011</p>
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<p>lanes on the ramp, then a <del>A</del> minimum of two signal faces per ramp shall face entering traffic. <del>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 one signal face shall be provided over the approximate center of each separately-controlled lane.</del></p> <p>If multiple lanes are present on an entrance ramp and the ramp control faces are operated such that green signal indications are not always displayed simultaneously to all of the lanes on the ramp, then:</p> <p>A. If there are two separately-controlled lanes, a minimum of two signal faces shall be provided for each of the two lanes, with both mounted at the side of the roadway on a single pole (see Option below), or a combination thereof.</p> <p>B. If there are three or more separately-controlled lanes, one signal face shall be provided over the approximate center of each separately-controlled lane.</p> <p><del>Additional side-mounted signal faces should be considered for ramps with three or more separately-controlled lanes.</del></p> <p>Standard: Ramp control signals shall be located and designed to minimize their viewing by mainline freeway traffic.</p> <p><del>D. Ramp control signals should be located at the point where it is intended for traffic to stop.</del></p> <p><del>E. Vehicle clearance intervals shorter than 3 seconds may be used.</del></p>	<p><b>simultaneously to all of the lanes on the ramp, then a minimum of two signal faces per ramp shall face entering traffic.</b></p> <p>04 <b>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 one signal face shall be provided over the approximate center of each separately-controlled lane.</b></p> <p><b>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 one signal face shall be provided over the approximate center of each separately-controlled lane.</b></p> <p>05 <i>Additional side-mounted signal faces should be considered for ramps with two or more separately-controlled lanes.</i></p> <p><b>Standard:</b></p> <p>06 <b>Ramp control signals shall be located and designed to minimize their viewing by mainline freeway traffic.</b></p> <p>Option:</p> <p>07 Ramp control signals may be placed in the dark mode (no indications displayed) when not in use.</p> <p>08 Ramp control signals may be used to control some, but not all, lanes on a ramp, such as when non-metered HOV bypass lanes are provided on a ramp.</p> <p>09 The required signal faces, if located at the side of the ramp roadway, may be mounted such that the height above the pavement grade at the center of the ramp roadway to the bottom of the signal housing of the lowest signal face is between 4.5 and 6 feet.</p>	<p>indications or a three section signal face containing red, yellow, and green signal indications.</p> <p>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.</p> <p>If multiple lanes are present on an entrance ramp and the ramp control faces are operated such that green signal indications are not always displayed simultaneously to all of the lanes on the ramp, then:</p> <p>A. If there are two separately-controlled lanes, a minimum of two signal faces shall be provided for each of the two lanes, with both mounted at the side of the roadway on a single pole (see Option below), or a combination thereof.</p> <p>B. If there are three or more separately-controlled lanes, one signal face shall be provided over the approximate center of each separately-controlled lane.</p> <p>Additional side-mounted signal faces should be considered for ramps with three or more separately-controlled lanes.</p> <p>Standard: Ramp control signals shall be located and designed to minimize their viewing by</p>	<p>Keep Mn language in standard section</p> <p>Was standard moved to option</p>
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<p><b><del>F.</del> Ramp control signal faces may be less than 2.4 m (8 ft) apart measured horizontally between centers of faces.</b></p> <p>Option:</p> <p><del>C.</del> Ramp control signals <del>faces need not</del> may be <del>illuminated</del> placed in the dark mode (no indications displayed) when not in use.</p> <p>Ramp control signals may be used to control some, but not all, lanes on a ramp, such as when non-metered HOV bypass lanes are provided on a ramp.</p> <p>The required signal faces, if located at the side of the ramp roadway, may be mounted such that the height above the pavement grade at the center of the ramp roadway to the bottom of the signal housing of the lowest signal face is between 1.4 m (4.5 ft) and 1.8 m (6 ft).</p> <p>For entrance ramps with only one controlled lane, the two required signal faces may both be mounted at the side of the roadway on a single pole, with one face at the normal mounting height and one face mounted lower as provided in Paragraph 9, as a specific exception to the normal 8-foot minimum lateral separation of signal faces required by Section 4D.13.</p> <p>Guidance: Regulatory signs with legends appropriate to the control, such as XX Vehicle (S) Per Green or XX VEHICLE(S) PER GREEN Each Lane (see Section 2B.56), should be installed adjacent to the ramp control signal faces. When ramp control signals are installed on a freeway-to-freeway ramp, special consideration should be given to assuring adequate visibility of the</p>	<p><sup>10</sup> For entrance ramps with only one controlled lane, the two required signal faces may both be mounted at the side of the roadway on a single pole, with one face at the normal mounting height and one face mounted lower as provided in Paragraph 9, as a specific exception to the normal 8-foot minimum lateral separation of signal faces required by Section 4D.13.</p> <p><i>Guidance:</i> <sup>11</sup> <i>Regulatory signs with legends appropriate to the control, such as XX Vehicle (S) Per Green or XX VEHICLE(S) PER GREEN Each Lane (see Section 2B.56), should be installed adjacent to the ramp control signal faces. When ramp control signals are installed on a freeway-to-freeway ramp, special consideration should be given to assuring adequate visibility of the ramp control signals, and multiple advance warning signs with flashing warning beacons should be installed to warn road users of the metered operation.</i></p>	<p>mainline freeway traffic.</p> <p><b>Ramp control signals should be located at the point where it is intended for traffic to stop.</b></p> <p><b>Vehicle clearance intervals shorter than 3 seconds may be used.</b></p> <p><b>Ramp control signal faces may be less than 2.4 m (8 ft) apart measured horizontally between centers of faces.</b></p> <p>Option:</p> <p>Ramp control signals may be placed in the dark mode (no indications displayed) when not in use.</p> <p>Ramp control signals may be used to control some, but not all, lanes on a ramp, such as when non-metered HOV bypass lanes are provided on a ramp.</p> <p>The required signal faces, if located at the side of the ramp roadway, may be mounted such that the height above the pavement grade at the center of the ramp roadway to the bottom of the signal housing of the lowest signal face is between 1.4 m (4.5 ft) and 1.8 m (6 ft).</p> <p>For entrance ramps with only one controlled lane, the two required signal faces may both be mounted at the side of the roadway on a single pole, with one face at the normal mounting height and one face mounted lower as provided in Paragraph 9, as a specific exception to the normal 8-foot minimum lateral separation of signal faces required by Section 4D.13.</p>	<p>Recommend adding new fed language</p> <p>Do we consider flashing yellow ramp meters in operation?</p> <p>Recommend adding Mn language</p>
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<p>ramp control signals, and multiple advance warning signs with flashing warning beacons should be installed to warn road users of the metered operation.</p> <p><b>Section 4L.03 Operation of Freeway Entrance Ramp Control Signals</b> Guidance: Operational strategies for ramp control signals, such as periods of operation, metering rates and algorithms, and queue management, should be determined by the operating agency prior to the installation of the ramp control signals and should be closely monitored and adjusted as needed thereafter.</p> <p>When the ramp control signals are operated only during certain periods of the day <b>and site distance is insufficient to react to stopped vehicles</b>, a RAMP METERED WHEN FLASHING (W3-8) sign (see Section 2C.37) should be installed in advance of the ramp control signal near the entrance to the ramp, or on the arterial on the approach to the ramp, to alert road users to the presence and operation of ramp meters.</p> <p>Standard: The RAMP METERED WHEN FLASHING sign shall be supplemented with a warning beacon (see Section 4L.03) that flashes when the ramp control signal is in operation.</p>	<p><b>Section 4L.03 Operation of Freeway Entrance Ramp Control Signals</b> <i>Guidance:</i> 01 <i>Operational strategies for ramp control signals, such as periods of operation, metering rates and algorithms, and queue management, should be determined by the operating agency prior to the installation of the ramp control signals and should be closely monitored and adjusted as needed thereafter.</i> 02 <i>When the ramp control signals are operated only during certain periods of the day, a RAMP METERED WHEN FLASHING (W3-8) sign (see Section 2C.37) should be installed in advance of the ramp control signal near the entrance to the ramp, or on the arterial on the approach to the ramp, to alert road users to the presence and operation of ramp meters.</i> <b>Standard:</b> 03 <b>The RAMP METERED WHEN FLASHING sign shall be supplemented with a warning beacon (see Section 4L.03) that flashes when the ramp control signal is in operation.</b></p>	<p>Guidance: Regulatory signs with legends appropriate to the control, such as XX Vehicle (S) Per Green or XX VEHICLE(S) PER GREEN Each Lane (see Section 2B.56), should be installed adjacent to the ramp control signal faces. When ramp control signals are installed on a freeway-to-freeway ramp, special consideration should be given to assuring adequate visibility of the ramp control signals, and multiple advance warning signs with flashing warning beacons should be installed to warn road users of the metered operation.</p> <p><b>Section 4L.03 Operation of Freeway Entrance Ramp Control Signals</b> Guidance: Operational strategies for ramp control signals, such as periods of operation, metering rates and algorithms, and queue management, should be determined by the operating agency prior to the installation of the ramp control signals and should be closely monitored and adjusted as needed thereafter.</p> <p>When the ramp control signals are operated only during certain periods of the day <b>and site distance is insufficient to react to stopped vehicles</b>, a RAMP METERED WHEN FLASHING (W3-8) sign (see Section 2C.37) should be installed in advance of the ramp control signal near the entrance to the ramp, or on the arterial on the approach to the ramp, to alert road users to the presence and operation of ramp meters.</p> <p>Standard:</p>	<p>No change</p>
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CHAPTER ~~4L~~ 4J TRAFFIC CONTROL FOR MOVABLE BRIDGES

~~4L.1~~ 4J.1 Application of Traffic Control for Movable Bridges

SUPPORT

Traffic control signals for movable bridges are a special type of highway traffic signal installed at movable bridges to notify road users to stop because of a road closure rather than alternately giving the right-of-way to conflicting traffic movements. The signals are operated in coordination with the opening and closing of the movable bridge, and with the operation of movable bridge warning and resistance gates, or other devices and features used to warn, control, and stop traffic.

Movable bridge warning gates installed at movable bridges decrease the likelihood of vehicles and pedestrians passing the stop line and entering an area where potential hazards exist because of bridge operations.

A movable bridge resistance gate is sometimes used at movable bridges and located downstream of the movable bridge warning gate. A movable bridge resistance gate provides a physical deterrent to road users when placed in the appropriate position. The movable bridge resistance gates are considered a design feature and not a traffic control device; requirements for them are contained in AASHTO’s “Standard Specifications for Movable Highway Bridges” (see Page i for AASHTO’s address).

STANDARD

CHAPTER 4J. TRAFFIC CONTROL FOR MOVABLE BRIDGES

Section 4J.01 Application of Traffic Control for Movable Bridges

Support:

01 Traffic control signals for movable bridges are a special type of highway traffic signal installed at movable bridges to notify road users to stop because of a road closure rather than alternately giving the right-of-way to conflicting traffic movements. The signals are operated in coordination with the opening and closing of the movable bridge, and with the operation of movable bridge warning and resistance gates, or other devices and features used to warn, control, and stop traffic.

02 Movable bridge warning gates installed at movable bridges decrease the likelihood of vehicles and pedestrians passing the stop line and entering an area where potential hazards exist because of bridge operations.

03 A movable bridge resistance gate is sometimes used at movable bridges and located downstream of the movable bridge warning gate. A movable bridge resistance gate provides a physical deterrent to road users when placed in the appropriate position. The movable bridge resistance gates are considered a design feature and not a traffic control device; requirements for them are contained in AASHTO’s “Standard Specifications for Movable Highway Bridges” (see Page i for AASHTO’s address).

Standard:

04 **Traffic control at movable bridges shall include both signals and gates, except in the following cases:**

The RAMP METERED WHEN FLASHING sign shall be supplemented with a warning beacon (see Section 4L.03) that flashes when the ramp control signal is in operation.

CHAPTER 4J TRAFFIC CONTROL FOR MOVABLE BRIDGES

4J.1 Application of Traffic Control for Movable Bridges

SUPPORT

Traffic control signals for movable bridges are a special type of highway traffic signal installed at movable bridges to notify road users to stop because of a road closure rather than alternately giving the right-of-way to conflicting traffic movements. The signals are operated in coordination with the opening and closing of the movable bridge, and with the operation of movable bridge warning and resistance gates, or other devices and features used to warn, control, and stop traffic.

Movable bridge warning gates installed at movable bridges decrease the likelihood of vehicles and pedestrians passing the stop line and entering an area where potential hazards exist because of bridge operations.

A movable bridge resistance gate is sometimes used at movable bridges and located downstream of the movable bridge warning gate. A movable bridge resistance gate provides a physical deterrent to road users when placed in the appropriate position. The movable bridge resistance gates are considered

<p>Traffic control at movable bridges shall include both signals and gates, except in the following cases:</p> <p>A. Neither is required if other traffic control devices or measures considered appropriate are used under either of the following conditions:</p> <ol style="list-style-type: none"> <li>1. On low-volume roads (roads of less than 400 vehicles average daily traffic); or</li> <li>2. At manually operated bridges if electric power is not available.</li> </ol> <p>B. Only signals are required in urban areas if intersecting streets or driveways make gates ineffective.</p> <p>C. Only movable bridge warning gates are required if a traffic control signal that is controlled as part of the bridge operations exists within 150 m (500 ft) of the movable bridge resistance gates and no intervening traffic entrances exist.</p> <p>Section <del>4I.2</del> 4J.2-Design and Location of Movable Bridge Signals and Gates</p> <p>STANDARD</p> <p>The signal <del>heads</del> faces and mountings of movable bridge signals shall <del>follow</del> comply with the provisions of Chapter 4D except as <del>noted</del> provided in this Section.</p> <p>Signal faces with 300 mm (12 in) diameter signal <del>lenses</del> indications <del>should</del> shall be used for all new movable bridge signals</p> <p>OPTION</p> <p><del>If prevailing approach speeds are 40 km/h (25</del></p>	<p><b>A. Neither is required if other traffic control devices or measures considered appropriate are used under either of the following conditions:</b></p> <ol style="list-style-type: none"> <li><b>1. On low-volume roads (roads of less than 400 vehicles average daily traffic), or</b></li> <li><b>2. At manually operated bridges if electric power is not available.</b></li> </ol> <p><b>B. Only signals are required in urban areas if intersecting streets or driveways make gates ineffective.</b></p> <p><b>C. Only movable bridge warning gates are required if a traffic control signal that is controlled as part of the bridge operations exists within 500 feet of the movable bridge resistance gates and no intervening traffic entrances exist.</b></p> <p>Section 4J.02 Design and Location of Movable Bridge Signals and Gates</p> <p>Standard:</p> <p>01 <b>The signal faces and mountings of movable bridge signals shall comply with the provisions of Chapter 4D except as provided in this Section.</b></p> <p>02 <b>Signal faces with 12-inch diameter signal indications shall be used for all new movable bridge signals.</b></p> <p>Option:</p> <p>03 Existing signal faces with 8-inch diameter lenses may be retained for the remainder of their useful service life.</p> <p><b>Standard:</b></p>	<p>a design feature and not a traffic control device; requirements for them are contained in AASHTO’s “Standard Specifications for Movable Highway Bridges” (see Page i for AASHTO’s address).</p> <p>STANDARD</p> <p>Traffic control at movable bridges shall include both signals and gates, except in the following cases:</p> <p>A. Neither is required if other traffic control devices or measures considered appropriate are used under either of the following conditions:</p> <ol style="list-style-type: none"> <li>1. On low-volume roads (roads of less than 400 vehicles average daily traffic); or</li> <li>2. At manually operated bridges if electric power is not available.</li> </ol> <p>B. Only signals are required in urban areas if intersecting streets or driveways make gates ineffective.</p> <p>C. Only movable bridge warning gates are required if a traffic control signal that is controlled as part of the bridge operations exists within 150 m (500 ft) of the movable bridge resistance gates and no intervening traffic entrances exist.</p> <p>Section 4J.2-Design and Location of Movable Bridge Signals and Gates</p> <p>STANDARD</p> <p>The signal faces and mountings of movable bridge signals shall comply with the provisions of Chapter 4D except as provided in this</p>	<p>Recommend changes</p>
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~~mph) or less.~~ Existing signal heads faces with 200 mm (8 in) diameter lenses may be ~~used~~ retained for the remainder of their useful service life.

#### STANDARD

Since movable bridge operations cover a variable range of time periods between openings, the signal faces shall be one of the following types:

- A. Three-section signal faces with red, yellow, and green signal ~~lenses~~ indications; or
- B. Two one-section signal faces with red signal ~~lenses~~ indications in a vertical array separated by a STOP HERE ON RED (R10-6) sign (see Section 2B.4553).

Regardless of which signal type is selected, ~~at least~~ two signal faces shall be provided for each approach to the movable span and a stop line (see Section 3B.16) shall be installed to indicate the point behind which vehicles are required to stop.

#### GUIDANCE:

If movable bridge operation is frequent, the use of three-section signal faces should be considered.

Insofar as practical, the height and lateral placement of signal faces should ~~conform to~~ comply with the requirements for other traffic control signals in accordance with ~~Section 4D.15~~ Chapter 4D. They should be located not more than 15 m (50 ft) in advance of the movable bridge warning gate.

#### OPTION

Movable bridge signals may be supplemented with audible warning devices to provide

04 **Since movable bridge operations cover a variable range of time periods between openings, the signal faces shall be one of the following types:**

- A. Three-section signal faces with red, yellow, and green signal indications; or**
- B. Two one-section signal faces with red signal indications in a vertical array separated by a STOP HERE ON RED (R10-6) sign (see Section 2B.53).**

05 **Regardless of which signal type is selected, at least two signal faces shall be provided for each approach to the movable span and a stop line (see Section 3B.16) shall be installed to indicate the point behind which vehicles are required to stop.**

#### Guidance:

06 *If movable bridge operation is frequent, the use of three-section signal faces should be considered.*

07 *Insofar as practical, the height and lateral placement of signal faces should comply with the requirements for other traffic control signals in accordance with Chapter 4D. They should be located no more than 50 feet in advance of the movable bridge warning gate.*

#### Option:

08 Movable bridge signals may be supplemented with audible warning devices to provide additional warning to drivers and pedestrians.

#### Standard:

09 **A DRAW BRIDGE (W3-6) sign (see Section 2C.39) shall be used in advance of movable bridge signals and gates to give warning to road users, except in urban conditions where such signing would not be practical.**

10 **If physical conditions prevent a road user from having a continuous view of at least**

Section.

Signal faces with 300 mm (12 in) diameter signal indications shall be used for all new movable bridge signals

#### OPTION

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

#### STANDARD

Since movable bridge operations cover a variable range of time periods between openings, the signal faces shall be one of the following types:

- A. Three-section signal faces with red, yellow, and green signal indications; or
- B. Two one-section signal faces with red signal indications in a vertical array separated by a STOP HERE ON RED (R10-6) sign (see Section 2B.53).

Regardless of which signal type is selected, at least two signal faces shall be provided for each approach to the movable span and a stop line (see Section 3B.16) shall be installed to indicate the point behind which vehicles are required to stop.

#### GUIDANCE:

If movable bridge operation is frequent, the use of three-section signal faces should be considered.

Insofar as practical, the height and lateral placement of signal faces should comply with the requirements for other traffic control signals in accordance with Chapter 4D. They should be located no more than 15 m (50 ft) in advance of the movable bridge warning gate.

<p>additional warning to drivers and pedestrians.</p> <p><b>STANDARD</b> A DRAWBRIDGE <del>AHEAD</del>-warning (W3-6) sign (see Section 2C.39) shall be used in advance of movable bridge signals and gates to give warning to road users, except in urban conditions where such signing would not be practical.</p> <p>If physical conditions prevent a road user from having a continuous view of at least two signal indications for the distance specified in Table 4D-2, an auxiliary device (either a supplemental signal face or the mandatory DRAWBRIDGE <del>AHEAD</del>-warning (W3-6) sign to which has been added a warning beacon that is interconnected with the movable bridge controller unit) shall be provided in advance of movable bridge signals and gates.</p> <p><b>OPTION</b> The DRAWBRIDGE <del>AHEAD</del> (W3-6) sign may be supplemented by a Warning Beacon (see Section <del>4K.3</del> 4L.3).</p> <p><b>STANDARD</b> If two sets of gates (both a warning and a resistance gate) are used for a single direction, highway traffic signals <del>need</del> shall not be required to accompany the resistance gate nearest the <del>span opening, but there shall be flashing red lights on the movable bridge warning gate.</del></p> <p>Movable bridge warning gates, if used, shall be at least standard railroad size, striped with 400 mm (16 in) alternate <del>diagonal</del> vertical, fully reflectorized red and white stripes. Flashing red lights in accordance with the Standards for</p>	<p><b>two signal indications for the distance specified in Table 4D-2, an auxiliary device (either a supplemental signal face or the mandatory DRAW BRIDGE (W3-6) sign to which has been added a warning beacon that is interconnected with the movable bridge controller unit) shall be provided in advance of movable bridge signals and gates.</b></p> <p><b>Option:</b> 11 The DRAW BRIDGE (W3-6) sign may be supplemented by a Warning Beacon (see Section 4L.03).</p> <p><b>Standard:</b> 12 <b>If two sets of gates (both a warning and a resistance gate) are used for a single direction, highway traffic signals shall not be required to accompany the resistance gate nearest the span opening.</b> 13 <b>Movable bridge warning gates, if used, shall be at least standard railroad size, striped with 16-inch alternate vertical, fully reflectorized red and white stripes. Flashing red lights in accordance with the Standards for those on railroad gates (see Section 8C.04) shall be included on the gate arm and they shall only be operated if the gate is closed or in the process of being opened or closed. In the horizontal position, the top of the gate shall be approximately 4 feet above the pavement.</b></p> <p><i>Guidance:</i> 14 <i>Movable bridge warning gates should be of lightweight construction. In its normal upright position, the gate arm should provide adequate lateral clearance.</i></p> <p><b>Option:</b> 15 The movable bridge resistance gates may be delineated, if practical, in a manner similar to the movable bridge warning gate.</p>	<p><b>OPTION</b> Movable bridge signals may be supplemented with audible warning devices to provide additional warning to drivers and pedestrians.</p> <p><b>STANDARD</b> A DRAWBRIDGE (W3-6) sign (see Section 2C.39) shall be used in advance of movable bridge signals and gates to give warning to road users, except in urban conditions where such signing would not be practical.</p> <p>If physical conditions prevent a road user from having a continuous view of at least two signal indications for the distance specified in Table 4D-2, an auxiliary device (either a supplemental signal face or the mandatory DRAWBRIDGE (W3-6) sign to which has been added a warning beacon that is interconnected with the movable bridge controller unit) shall be provided in advance of movable bridge signals and gates.</p> <p><b>OPTION</b> The DRAWBRIDGE (W3-6) sign may be supplemented by a Warning Beacon (see Section 4L.3).</p> <p><b>STANDARD</b> If two sets of gates (both a warning and a resistance gate) are used for a single direction, highway traffic signals shall not be required to accompany the resistance gate nearest the.</p> <p>Movable bridge warning gates, if used, shall be at least standard railroad size, striped with 400 mm (16 in) alternate vertical, fully reflectorized red and white stripes. Flashing red lights in accordance with the Standards for</p>	
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<p>those on railroad gates (see Section <del>8D.4</del> 8C.4) shall be included on the gate arm and they shall only be operated if the gate is closed or in the process of being opened or closed. In the horizontal position, the top of the gate shall be approximately 1.2 m (4 ft) above the pavement.</p> <p><b>GUIDANCE</b> Movable bridge warning gates should be of lightweight construction. In its normal upright position, the gate arm should provide adequate lateral clearance.</p> <p><b>OPTION</b> The movable bridge resistance gates may be delineated, if practical, in a manner similar to the movable bridge warning gate.</p> <p><b>STANDARD</b> Movable bridge warning gates, if used, shall extend at least across the full width of the approach lanes if movable bridge resistance gates are used. On divided highways in which the roadways are separated by a barrier median, movable bridge warning gates, if used, shall extend across all roadway lanes approaching the span openings.</p> <p><b>GUIDANCE</b> If movable bridge resistance gates are not used on undivided highways, movable bridge warning gates, if used, should extend across the full width of the roadway.</p> <p><b>OPTION</b> A single full-width gate or two half-width gates may be used.</p>	<p><b>Standard:</b> 16 <b>Movable bridge warning gates, if used, shall extend at least across the full width of the approach lanes if movable bridge resistance gates are used. On divided highways in which the roadways are separated by a barrier median, movable bridge warning gates, if used, shall extend across all roadway lanes approaching the span openings.</b></p> <p><i>Guidance:</i> 17 <i>If movable bridge resistance gates are not used on undivided highways, movable bridge warning gates, if used, should extend across the full width of the roadway.</i></p> <p><b>Option:</b> 18 A single full-width gate or two half-width gates may be used.</p> <p><b>Support:</b> 19 The locations of movable bridge signals and gates are determined by the location of the movable bridge resistance gate (if used) rather than by the location of the movable spans. The movable bridge resistance gates for high-speed highways are preferably located 50 feet or more from the span opening except for bascule and lift bridges, where they are often attached to, or are a part of, the structure.</p> <p><b>Standard:</b> 20 <b>Except where physical conditions make it impractical, movable bridge warning gates shall be located 100 feet or more from the movable bridge resistance gates or, if movable bridge resistance gates are not used, 100 feet or more from the movable span.</b></p> <p><i>Guidance:</i> 21 <i>On bridges or causeways that cross a long reach of water and that might be hit by large marine vessels, within the limits of practicality,</i></p>	<p>those on railroad gates (see Section 8C.4) shall be included on the gate arm and they shall only be operated if the gate is closed or in the process of being opened or closed. In the horizontal position, the top of the gate shall be approximately 1.2 m (4 ft) above the pavement.</p> <p><b>GUIDANCE</b> Movable bridge warning gates should be of lightweight construction. In its normal upright position, the gate arm should provide adequate lateral clearance.</p> <p><b>OPTION</b> The movable bridge resistance gates may be delineated, if practical, in a manner similar to the movable bridge warning gate.</p> <p><b>STANDARD</b> Movable bridge warning gates, if used, shall extend at least across the full width of the approach lanes if movable bridge resistance gates are used. On divided highways in which the roadways are separated by a barrier median, movable bridge warning gates, if used, shall extend across all roadway lanes approaching the span openings.</p> <p><b>GUIDANCE</b> If movable bridge resistance gates are not used on undivided highways, movable bridge warning gates, if used, should extend across the full width of the roadway.</p> <p><b>OPTION</b> A single full-width gate or two half-width gates may be used.</p>	
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<p><b>SUPPORT</b>  <del>Highway traffic signals need not accompany the gates nearest the span opening.</del>  The locations of movable bridge signals and gates are determined by the location of the movable bridge resistance gate (if used) rather than by the location of the movable spans. The movable bridge resistance gates for high-speed highways are preferably located 15 m (50 ft) or more from the span opening except for bascule and lift bridges, where they are often attached to, or are a part of, the structure.</p> <p><b>STANDARD</b>  Except where physical conditions make it impractical, movable bridge warning gates shall be located 30 m (100 ft) or more from the movable bridge resistance gates or, if movable bridge resistance gates are not used, 30 m (100 ft) or more from the movable span.</p> <p><b>GUIDANCE</b>  On bridges or causeways that cross a long reach of water and that might be hit by large marine vessels, within the limits of practicality, traffic should not be halted on a section of the bridge or causeway that is subject to impact.</p> <p>In cases where it is not practical to halt traffic on a span that is not subject to impact, traffic should be halted at least one span from the opening. If traffic is halted by signals and gates more than 100 m (330 ft) from the movable bridge warning gates (or from the span opening if movable bridge warning gates are not used), a second set of gates should be installed approximately 30 m (100 ft) from the gate or span opening.</p>	<p><i>traffic should not be halted on a section of the bridge or causeway that is subject to impact.</i>  22 <i>In cases where it is not practical to halt traffic on a span that is not subject to impact, traffic should be halted at least one span from the opening. If traffic is halted by signals and gates more than 330 feet from the movable bridge warning gates (or from the span opening if movable bridge warning gates are not used), a second set of gates should be installed approximately 100 feet from the gate or span opening.</i>  23 <i>If the movable bridge is close to a grade crossing and traffic might possibly be stopped on the crossing as a result of the bridge opening, a traffic control device should notify the road users to not stop on the railroad tracks.</i></p>	<p><b>SUPPORT</b>  The locations of movable bridge signals and gates are determined by the location of the movable bridge resistance gate (if used) rather than by the location of the movable spans. The movable bridge resistance gates for high-speed highways are preferably located 15 m (50 ft) or more from the span opening except for bascule and lift bridges, where they are often attached to, or are a part of, the structure.</p> <p><b>STANDARD</b>  Except where physical conditions make it impractical, movable bridge warning gates shall be located 30 m (100 ft) or more from the movable bridge resistance gates or, if movable bridge resistance gates are not used, 30 m (100 ft) or more from the movable span.</p> <p><b>GUIDANCE</b>  On bridges or causeways that cross a long reach of water and that might be hit by large marine vessels, within the limits of practicality, traffic should not be halted on a section of the bridge or causeway that is subject to impact.</p> <p>In cases where it is not practical to halt traffic on a span that is not subject to impact, traffic should be halted at least one span from the opening. If traffic is halted by signals and gates more than 100 m (330 ft) from the movable bridge warning gates (or from the span opening if movable bridge warning gates are not used), a second set of gates should be installed approximately 30 m (100 ft) from the gate or span opening.</p> <p>If the movable bridge is close to a grade crossing and traffic might possibly be stopped</p>	<p>Committee recommends changes</p>
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<p>If the movable bridge is close to a <del>highway-rail</del> grade crossing and traffic might possibly be stopped on the crossing as a result of the bridge opening, a traffic control device should notify the road users to not stop on the railroad tracks.</p> <p><del>4I.3</del> 4J.3      Operation of Movable Bridge Signals and Gates</p> <p>STANDARD</p> <p>Traffic control devices at movable bridges shall be coordinated with the movable spans, so that the signals, gates, and movable spans are controlled by the bridge tender through an interlocked control.</p> <p>If the three-section type of signal face is used, the green signal indication shall be <del>illuminated</del> displayed at all times between bridge openings, except that if the bridge is not expected to open during continuous periods in excess of 5 hours, a flashing yellow signal indication <del>may</del> shall be permitted to be used. The signal shall display a steady red signal indication when traffic is required to stop. The duration of the yellow change interval between the display of the <del>steady</del> green and steady red signal indications, or flashing yellow and steady red signal indications, shall be <del>pre</del>determined using engineering practices (see Section 4D.26).</p> <p>If the vertical array of red signal <del>lenses</del></p>	<p><b>Section 4J.03 Operation of Movable Bridge Signals and Gates</b></p> <p><b>Standard:</b></p> <p>01 <b>Traffic control devices at movable bridges shall be coordinated with the movable spans, so that the signals, gates, and movable spans are controlled by the bridge tender through an interlocked control.</b></p> <p>02 <b>If the three-section type of signal face is used, the green signal indication shall be displayed at all times between bridge openings, except that if the bridge is not expected to open during continuous periods in excess of 5 hours, a flashing yellow signal indication shall be permitted to be used. The signal shall display a steady red signal indication when traffic is required to stop. The duration of the yellow change interval between the display of the green and steady red signal indications, or flashing yellow and steady red signal indications, shall be determined using engineering practices (see Section 4D.26).</b></p> <p>03 <b>If the vertical array of red signal indications is the type of signal face selected, the red signal indications shall flash alternately only when traffic is required to stop.</b></p> <p><i>Guidance:</i></p> <p>04 <i>The yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds. The longer</i></p>	<p>on the crossing as a result of the bridge opening, a traffic control device should notify the road users to not stop on the railroad tracks.</p> <p>4J.3      Operation of Movable Bridge Signals and Gates</p> <p>STANDARD</p> <p>Traffic control devices at movable bridges shall be coordinated with the movable spans, so that the signals, gates, and movable spans are controlled by the bridge tender through an interlocked control.</p> <p>If the three-section type of signal face is used, the green signal indication shall be displayed at all times between bridge openings, except that if the bridge is not expected to open during continuous periods in excess of 5 hours, a flashing yellow signal indication shall be permitted to be used. The signal shall display a steady red signal indication when traffic is required to stop. The duration of the yellow change interval between the display of the green and steady red signal indications, or</p>	
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<p><i>indications</i> is the type of signal face selected, the red signal <del>lenses</del> <i>indications</i> shall flash alternately only when traffic is required to stop.</p> <p><b>GUIDANCE</b></p> <p>The <del>duration of the</del> yellow change interval should have a <del>range from</del> <i>minimum duration of 3 to 6</i> seconds and a <i>maximum duration of 6</i> seconds. The longer intervals should be reserved for use on approaches with higher speeds.</p> <p><i>Traffic control S</i>signals on adjacent streets and highways should be interconnected with the drawbridge control if indicated by engineering judgment. <i>When such interconnection is provided, the traffic control signals at adjacent intersections should be preempted by the operation of the movable bridge in the manner described in Section 4D.27.</i></p> <p><b>CHAPTER 4K. highway TRAFFIC SIGNALS AT TOLL PLAZAS</b></p> <p><b>Section 4K.01 Traffic Signals at Toll Plazas</b> Standard: Traffic control signals or devices that closely resemble traffic control signals that use red or green circular indications shall not be used at</p>	<p><i>intervals should be reserved for use on approaches with higher speeds.</i></p> <p><i>05 Traffic control signals on adjacent streets and highways should be interconnected with the drawbridge control if indicated by engineering judgment. When such interconnection is provided, the traffic control signals at adjacent intersections should be preempted by the operation of the movable bridge in the manner described in Section 4D.27.</i></p> <p><b>CHAPTER 4K. highway TRAFFIC SIGNALS AT TOLL PLAZAS</b></p> <p><b>Section 4K.01 Traffic Signals at Toll Plazas</b> Standard: <b>01 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 to indicate the</b></p>	<p>flashing yellow and steady red signal indications, shall be determined using engineering practices (see Section 4D.26).</p> <p>If the vertical array of red signal indications is the type of signal face selected, the red signal indications shall flash alternately only when traffic is required to stop.</p> <p><b>GUIDANCE</b></p> <p>The yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds. The longer intervals should be reserved for use on approaches with higher speeds.</p> <p>Traffic control signals on adjacent streets and highways should be interconnected with the drawbridge control if indicated by engineering judgment. When such interconnection is provided, the traffic control signals at adjacent intersections should be preempted by the operation of the movable bridge in the manner described in Section 4D.27.</p> <p><b>CHAPTER 4K. highway TRAFFIC SIGNALS AT TOLL PLAZAS</b></p> <p><b>Section 4K.01 Traffic Signals at Toll</b></p>	<p>New language recommend adding</p> <p>New language recommend adding with change to meet Mn text</p>
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<p>toll plazas to indicate the open or closed status of the toll plaza lanes.</p> <p>Guidance: Traffic control signals or devices that closely resemble traffic control signals that use red or green circular indications should not be used for new or reconstructed installations at toll plazas to indicate the success or failure of electronic toll payments or to alternately direct drivers making cash toll payments to stop and then proceed.</p> <p><b>Section 4K.02 Lane-Use Control Signals at or Near Toll Plazas</b></p> <p>Standard: Lane-use control signals used at toll plazas shall comply with the provisions of Chapter 4M except as otherwise provided in this Section. At toll plazas with multiple lanes where one or more lanes is sometimes closed to traffic, a lane-use control signal shall be installed above the center of each toll plaza lane to indicate the open or closed status of the controlled lane.</p> <p>Option: The bottom of the signal housing of a lane-use control signal above a toll plaza lane having a canopy may be mounted lower than <del>15</del> <b>17</b> feet above the pavement, but not lower than the vertical clearance of the canopy structure.</p> <p>Lane-use control signals may also be used to indicate the open or closed status of an Open-Road ETC lane as a supplement to other</p>	<p><b>open or closed status of the toll plaza lanes.</b></p> <p>Guidance: <i>02 Traffic control signals or devices that closely resemble traffic control signals that use red or green circular indications should not be used for new or reconstructed installations at toll plazas to indicate the success or failure of electronic toll payments or to alternately direct drivers making cash toll payments to stop and then proceed.</i></p> <p><b>Section 4K.02 Lane-Use Control Signals at or Near Toll Plazas</b></p> <p>Standard: <b>01 Lane-use control signals used at toll plazas shall comply with the provisions of Chapter 4M except as otherwise provided in this Section.</b> <b>02 At toll plazas with multiple lanes where one or more lanes is sometimes closed to traffic, a lane-use control signal shall be installed above the center of each toll plaza lane to indicate the open or closed status of the controlled lane.</b></p> <p>Option: 03 The bottom of the signal housing of a lane-use control signal above a toll plaza lane having a canopy may be mounted lower than 15 feet above the pavement, but not lower than the vertical clearance of the canopy structure. 04 Lane-use control signals may also be used to indicate the open or closed status of an Open-Road ETC lane as a supplement to other devices used for the temporary closure of a lane (see Part 6).</p>	<p><b>Plazas</b></p> <p>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 to indicate the open or closed status of the toll plaza lanes.</p> <p>Guidance: Traffic control signals or devices that closely resemble traffic control signals that use red or green circular indications should not be used for new or reconstructed installations at toll plazas to indicate the success or failure of electronic toll payments or to alternately direct drivers making cash toll payments to stop and then proceed.</p> <p><b>Section 4K.02 Lane-Use Control Signals at or Near Toll Plazas</b></p> <p>Standard: Lane-use control signals used at toll plazas shall comply with the provisions of Chapter 4M except as otherwise provided in this Section. At toll plazas with multiple lanes where one or more lanes is sometimes closed to traffic, a lane-use control signal shall be installed above the center of each toll plaza lane to indicate the open or closed status of the controlled lane.</p> <p>Option: The bottom of the signal housing of a lane-use control signal above a toll plaza lane having a canopy may be mounted lower than <b>17</b> feet above the pavement, but not lower than the</p>	<p>Change to meet current Mn language</p> <p>New language. Recommend change</p>
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<p>devices used for the temporary closure of a lane (see Part 6).</p> <p><b>Section 4K.03 Warning Beacons at Toll Plazas</b>  Standard:  Warning Beacons used at toll plazas shall comply with the provisions of Chapter 4L except as otherwise provided in this Section.</p> <p>Guidance:  Warning Beacons, if used with a toll plaza canopy sign (see Section 2F.16) to assist drivers of such vehicles in locating the dedicated ETC Account-Only lane(s), should be installed in a manner such that the beacons are distinctly separate from the lane-use control signals (see Section 4M.01) for the toll plaza lane.</p> <p>Option:  Warning Beacons that are mounted on toll plaza islands, 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 8 feet above the pavement.</p> <p><b>CHAPTER <del>4K.</del> 4L FLASHING BEACONS</b></p>	<p><b>Section 4K.03 Warning Beacons at Toll Plazas</b>  <b>Standard:</b>  01 <b>Warning Beacons used at toll plazas shall comply with the provisions of Chapter 4L except as otherwise provided in this Section.</b>  <i>Guidance:</i>  02 <i>Warning Beacons, if used with a toll plaza canopy sign (see Section 2F.16) to assist drivers of such vehicles in locating the dedicated ETC Account-Only lane(s), should be installed in a manner such that the beacons are distinctly separate from the lane-use control signals (see Section 4M.01) for the toll plaza lane.</i>  <b>Option:</b>  03 Warning Beacons that are mounted on toll plaza islands, 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 8 feet above the pavement.</p> <p><b>CHAPTER 4L. FLASHING BEACONS</b></p>	<p>vertical clearance of the canopy structure.</p> <p>Lane-use control signals may also be used to indicate the open or closed status of an Open-Road ETC lane as a supplement to other devices used for the temporary closure of a lane (see Part 6).</p> <p><b>Section 4K.03 Warning Beacons at Toll Plazas</b>  Standard:  Warning Beacons used at toll plazas shall comply with the provisions of Chapter 4L except as otherwise provided in this Section.</p> <p>Guidance:  Warning Beacons, if used with a toll plaza canopy sign (see Section 2F.16) to assist drivers of such vehicles in locating the dedicated ETC Account-Only lane(s), should be installed in a manner such that the beacons are distinctly separate from the lane-use control signals (see Section 4M.01) for the toll plaza lane.</p> <p>Option:  Warning Beacons that are mounted on toll plaza islands, 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 8 feet above the pavement.</p>	<p>Recommend change</p> <p>Relocated from</p>
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<p><del>4K.1</del> 4L.1 General Design and Operation of Flashing Beacons</p> <p><b>SUPPORT</b> A Flashing Beacon is a highway traffic signal with one or more signal sections that operates in a flashing mode. It can provide traffic control when used as an intersection control beacon (see Section 4L.2) or <del>warning in alternative uses</del> it can provide warning when used in other applications (see Sections 4L.3, 4L.4, and 4L.5).</p> <p><b>STANDARD</b> Flashing Beacon units and their mountings shall <del>follow</del> comply with the provisions of Chapter 4D, except as <del>specified herein</del> provided in this Chapter.</p> <p>Beacons shall be flashed at a rate of not less than 50 <del>nor</del> more than 60 times per minute. The illuminated period of each flash shall <del>not</del> be <del>less than one-half</del> a minimum of 1/2 and <del>not more than two-thirds</del> a maximum of 2/3 of the total cycle.</p> <p><del>The</del> A beacon shall not be included within the border of <del>the</del> a sign except for SCHOOL SPEED LIMIT sign beacons (see Sections 4L.4 and 7B.15).</p> <p><b>GUIDANCE</b> If used to supplement a warning or regulatory sign, the edge of the beacon signal housing should normally be located no closer than 300 mm (12 in) outside of the nearest edge of the sign.</p>	<p><b>Section 4L.01 General Design and Operation of Flashing Beacons</b> Support: 01 A Flashing Beacon is a highway traffic signal with one or more signal sections that operates in a flashing mode. It can provide traffic control when used as an intersection control beacon (see Section 4L.02) or it can provide warning when used in other applications (see Sections 4L.03, 4L.04, and 4L.05).</p> <p><b>Standard:</b> 02 <b>Flashing Beacon units and their mountings shall comply with the provisions of Chapter 4D, except as otherwise provided in this Chapter.</b> 03 <b>Beacons shall be flashed at a rate of not less than 50 or more than 60 times per minute. The illuminated period of each flash shall be a minimum of 1/2 and a maximum of 2/3 of the total cycle.</b> 04 <b>A beacon shall not be included within the border of a sign except for SCHOOL SPEED LIMIT sign beacons (see Sections 4L.04 and 7B.15).</b> <i>Guidance:</i> 05 <i>If used to supplement a warning or regulatory sign, the edge of the beacon signal housing should normally be located no closer than 12 inches outside of the nearest edge of the sign.</i> Option: 06 An automatic dimming device may be used to reduce the brilliance of flashing yellow signal indications during night operation.</p>	<p><b>CHAPTER 4L FLASHING BEACONS</b></p> <p>4L.1 General Design and Operation of Flashing Beacons</p> <p><b>SUPPORT</b> A Flashing Beacon is a highway traffic signal with one or more signal sections that operates in a flashing mode. It can provide traffic control when used as an intersection control beacon (see Section 4L.2) or it can provide warning when used in other applications (see Sections 4L.3, 4L.4, and 4L.5).</p> <p><b>STANDARD</b> Flashing Beacon units and their mountings shall comply with the provisions of Chapter 4D, except as provided in this Chapter.</p> <p>Beacons shall be flashed at a rate of not less than 50 or more than 60 times per minute. The illuminated period of each flash shall be a minimum of 1/2 and a maximum of 2/3 of the total cycle.</p> <p>A beacon shall not be included within the border of a sign except for SCHOOL SPEED LIMIT sign beacons (see Sections 4L.4 and 7B.15).</p> <p><b>GUIDANCE</b> If used to supplement a warning or regulatory sign, the edge of the beacon signal housing should normally be located no closer than 300</p>	<p>4K.3</p> <p>Mn language. Committee not sure why it is the way Mn manual reads</p> <p>Mn manual does not allow option A</p>
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<p>OPTION</p> <p>An automatic dimming device may be used to reduce the brilliance of flashing yellow signal indications during night operation.</p> <p>4K.2 Intersection Control Beacon</p> <p>STANDARD</p> <p>An Intersection Control Beacon shall consist of <b>two</b> or more signal faces <b>mounted overhead</b> directed toward each approach to an intersection <b>to supplement an all-way Stop sign configuration</b>. Each signal face shall consist of one or more signal sections of a standard traffic signal face, with flashing CIRCULAR RED signal indications in each signal face.</p> <p>Application of Intersection Control Beacon signal indications shall be limited to Red for all approaches.</p> <p>A STOP sign shall be used on approaches to which a flashing red signal indication is <del>shown</del> <b>displayed</b> on an Intersection Control Beacon (see Section 2B.4).</p> <p><del>If two horizontally aligned red signal indications are used on an approach for an</del></p>	<p><b>Section 4L.02 Intersection Control Beacon</b></p> <p><b>Standard:</b></p> <p>01 <b>An Intersection Control Beacon shall consist of one or more signal faces directed toward each approach to an intersection. Each signal face shall consist of one or more signal sections of a standard traffic signal face, with flashing CIRCULAR YELLOW or CIRCULAR RED signal indications in each signal face. They shall be installed and used only at an intersection to control two or more directions of travel.</b></p> <p>02 <b>Application of Intersection Control Beacon signal indications shall be limited to the following:</b></p> <p><b>A. Yellow on one route (normally the major street) and red for the remaining approaches, and</b></p> <p><b>B. Red for all approaches (if the warrant described in Section 2B.07 for a multi-way stop is satisfied).</b></p> <p>03 <b>Flashing yellow signal indications shall not face conflicting vehicular approaches.</b></p> <p>04 <b>A STOP sign shall be used on approaches to which a flashing red signal indication is displayed on an Intersection Control Beacon (see Section 2B.04).</b></p> <p>05 <b>If two horizontally aligned red signal</b></p>	<p>mm (12 in) outside of the nearest edge of the sign.</p> <p>OPTION</p> <p>An automatic dimming device may be used to reduce the brilliance of flashing yellow signal indications during night operation.</p> <p>4K.2 Intersection Control Beacon</p> <p>STANDARD</p> <p>An Intersection Control Beacon shall consist of <b>two</b> or more signal faces <b>mounted overhead</b> directed toward each approach to an intersection <b>to supplement an all-way Stop sign configuration</b>. Each signal face shall consist of one or more signal sections of a standard traffic signal face, with flashing CIRCULAR RED signal indications in each signal face.</p> <p>Application of Intersection Control Beacon signal indications shall be limited to Red for all approaches.</p> <p>A STOP sign shall be used on approaches to which a flashing red signal indication is displayed on an Intersection Control Beacon (see Section 2B.4).</p>	<p>Recommend changing to read the same as a flashing signal</p> <p>Guidance is not in Mn manual</p>
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<p><del>Intersection Control Beacon, they shall be flashed simultaneously to avoid being confused with grade crossing flashing-light signals. If two vertically aligned red signal indications are used on an approach for an Intersection Control Beacon, they shall be flashed alternately.</del></p> <p>OPTION Supplemental signal indications may be used on one or more approaches in order to provide adequate visibility to approaching road users.</p> <p>Intersection Control Beacons may be used at intersections where traffic or physical conditions do not justify conventional traffic control signals but crash rates indicate the possibility of a special need.</p> <p>An Intersection Control Beacon is generally located over the center of an intersection; however, it may be used at other suitable locations.</p> <p>SUPPORT <b>Studies have shown that at locations having flashing CIRCULAR YELLOW signal indications for the major approach and flashing CIRCULAR RED signal indications for the minor approach, drivers facing the flashing red on the minor approach may assume that the major approach is also displaying a flashing red, and could pull out in front of a conflicting vehicle.</b></p> <p>OPTION</p>	<p><b>indications are used on an approach for an Intersection Control Beacon, they shall be flashed simultaneously to avoid being confused with grade crossing flashing-light signals. If two vertically aligned red signal indications are used on an approach for an Intersection Control Beacon, they shall be flashed alternately.</b></p> <p><i>Guidance:</i> 06 <i>An Intersection Control Beacon should not be mounted on a pedestal in the roadway unless the pedestal is within the confines of a traffic or pedestrian island.</i></p> <p>Option: 07 Supplemental signal indications may be used on one or more approaches in order to provide adequate visibility to approaching road users. 08 Intersection Control Beacons may be used at intersections where traffic or physical conditions do not justify conventional traffic control signals but crash rates indicate the possibility of a special need. 09 An Intersection Control Beacon is generally located over the center of an intersection; however, it may be used at other suitable locations.</p>	<p>Red signal indications used on an approach for an Intersection Control Beacon, shall be flashed simultaneously to avoid being confused with grade crossing flashing-light signals.</p> <p>OPTION Supplemental signal indications may be used on one or more approaches in order to provide adequate visibility to approaching road users.</p> <p>Intersection Control Beacons may be used at intersections where traffic or physical conditions do not justify conventional traffic control signals but crash rates indicate the possibility of a special need.</p> <p>An Intersection Control Beacon is generally located over the center of an intersection; however, it may be used at other suitable locations.</p> <p>SUPPORT <b>Studies have shown that at locations having flashing CIRCULAR YELLOW signal indications for the major approach and flashing CIRCULAR RED signal indications for the minor approach, drivers facing the flashing red on the minor approach may assume that the major approach is also displaying a flashing red, and could pull out in front of a conflicting vehicle.</b></p>	<p>Keep Mn text</p> <p>Changes OK, keep MN minimum signal height in bold</p>
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<p><b>If there is a need for warning at a two-way stop intersection, a warning beacon in an Intersection Ahead (W2 series) sign for the major approach and/or a stop beacon with the STOP sign for the minor approach may be appropriate.</b></p> <p><del>4K.3</del> 4L.3 Warning Beacon</p> <p><b>SUPPORT</b>  Typical applications of Warning Beacons include the following:  A. At obstructions in or immediately adjacent to the roadway;  B. As supplemental emphasis to warning signs;  C. As emphasis for midblock crosswalks;  <del>D. — On approaches to intersections where additional warning is required, or where special conditions exist; and</del>  E. D. As supplemental emphasis to regulatory signs, except STOP, <del>YIELD</del>, DO NOT ENTER, WRONG WAY, and SPEED LIMIT signs; and  E. In conjunction with a regulatory or warning sign that includes the phrase WHEN FLASHING in its legend to indicate that the regulation is in effect or that the condition is present only at certain times.</p> <p><b>STANARD</b>  A Warning Beacon shall consist of one or more signal sections of a standard traffic signal face with a flashing CIRCULAR YELLOW signal indication in each signal section.</p>	<p><b>Section 4L.03 Warning Beacon</b>  Support:  01 Typical applications of Warning Beacons include the following:  A. At obstructions in or immediately adjacent to the roadway;  B. As supplemental emphasis to warning signs;  C. As emphasis for midblock crosswalks;  D. As supplemental emphasis to regulatory signs, except STOP, DO NOT ENTER, WRONG WAY, and SPEED LIMIT signs; and  E. In conjunction with a regulatory or warning sign that includes the phrase WHEN FLASHING in its legend to indicate that the regulation is in effect or that the condition is present only at certain times.</p> <p><b>Standard:</b>  02 <b>A Warning Beacon shall consist of one or more signal sections of a standard traffic signal face with a flashing CIRCULAR YELLOW signal indication in each signal section.</b>  03 <b>A Warning Beacon shall be used only to supplement an appropriate warning or regulatory sign or marker.</b>  04 <b>Warning Beacons, if used at intersections, shall not face conflicting vehicular approaches.</b>  05 <b>If a Warning Beacon is suspended over</b></p>	<p><b>OPTION</b>  <b>If there is a need for warning at a two-way stop intersection, a warning beacon in an Intersection Ahead (W2 series) sign for the major approach and/or a stop beacon with the STOP sign for the minor approach may be appropriate.</b></p> <p>4L.3 Warning Beacon  <b>SUPPORT</b>  Typical applications of Warning Beacons include the following:  A. At obstructions in or immediately adjacent to the roadway;  B. As supplemental emphasis to warning signs;  C. As emphasis for midblock crosswalks;  D. As supplemental emphasis to regulatory signs, except STOP, DO NOT ENTER, WRONG WAY, and SPEED LIMIT signs; and  E. In conjunction with a regulatory or warning sign that includes the phrase WHEN FLASHING in its legend to indicate that the regulation is in effect or that the condition is present only at certain times.</p> <p><b>STANARD</b>  A Warning Beacon shall consist of one or more signal sections of a standard traffic signal face with a flashing CIRCULAR YELLOW signal indication in each signal section.</p>	
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<p>A Warning Beacon shall be used only to supplement an appropriate warning or regulatory sign or marker.</p> <p>Warning Beacons, if used at intersections, shall not face conflicting vehicular approaches. If a Warning Beacon is suspended over the roadway, the clearance above the pavement shall be <del>at least a minimum of 4.6 m (15 ft)</del> <b>17 ft</b> <del>but not more than</del> and a maximum of 5.8 m (19 ft).</p> <p><b>GUIDANCE</b> The condition or regulation justifying Warning Beacons should largely govern their location with respect to the roadway.</p> <p>If an obstruction is in or adjacent to the roadway, illumination of the lower portion or the beginning of the obstruction or a sign on or in front of the obstruction, in addition to the beacon, should be considered.</p> <p>Warning Beacons should be operated only during those <del>hours</del> <b>periods or times</b> when the condition or regulation exists.</p> <p><b>OPTION</b> <b>Warning Beacons that are actuated by pedestrians, bicyclists, or other road users may be used as appropriate to provide additional warning to vehicles approaching a crossing or other location.</b></p> <p>If Warning Beacons have more than one signal section, they may be flashed either alternately or simultaneously.</p> <p>A flashing yellow beacon interconnected with</p>	<p><b>the roadway, the clearance above the pavement shall be a minimum of 15 feet and a maximum of 19 feet.</b></p> <p><i>Guidance:</i></p> <p>06 <i>The condition or regulation justifying Warning Beacons should largely govern their location with respect to the roadway.</i></p> <p>07 <i>If an obstruction is in or adjacent to the roadway, illumination of the lower portion or the beginning of the obstruction or a sign on or in front of the obstruction, in addition to the beacon, should be considered.</i></p> <p>08 <i>Warning Beacons should be operated only during those periods or times when the condition or regulation exists.</i></p> <p><b>Option:</b></p> <p>09 Warning Beacons that are actuated by pedestrians, bicyclists, or other road users may be used as appropriate to provide additional warning to vehicles approaching a crossing or other location.</p> <p>10 If Warning Beacons have more than one signal section, they may be flashed either alternately or simultaneously.</p> <p>11 A flashing yellow beacon interconnected with a traffic signal controller assembly may be used with a traffic signal warning sign (see Section 2C.36).</p>	<p>A Warning Beacon shall be used only to supplement an appropriate warning or regulatory sign or marker.</p> <p>Warning Beacons, if used at intersections, shall not face conflicting vehicular approaches. If a Warning Beacon is suspended over the roadway, the clearance above the pavement shall be a minimum of <del>4.6 m (15 ft)</del> <b>17 ft</b> and a maximum of 5.8 m (19 ft).</p> <p><b>GUIDANCE</b> The condition or regulation justifying Warning Beacons should largely govern their location with respect to the roadway.</p> <p>If an obstruction is in or adjacent to the roadway, illumination of the lower portion or the beginning of the obstruction or a sign on or in front of the obstruction, in addition to the beacon, should be considered.</p> <p>Warning Beacons should be operated only during those periods or times when the condition or regulation exists.</p> <p><b>OPTION</b> Warning Beacons that are actuated by pedestrians, bicyclists, or other road users may be used as appropriate to provide additional warning to vehicles approaching a crossing or other location.</p> <p>If Warning Beacons have more than one signal section, they may be flashed either alternately or simultaneously.</p> <p>A flashing yellow beacon interconnected with a traffic signal controller assembly may be</p>	<p>Changes OK</p>
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<p>a traffic signal controller assembly may be used with a traffic signal warning sign (see Section 2C.2936).</p> <p><del>4K.4</del> 4L.4 Speed Limit Sign Beacon STANDARD A Speed Limit Sign Beacon shall be used only to supplement a Speed Limit sign.</p> <p>A Speed Limit Sign Beacon shall consist of one or more signal sections of a standard traffic control signal face, with a flashing CIRCULAR YELLOW signal indication in each signal section. The signal <del>lenses</del> indications shall have a nominal diameter of not less than 200 mm (8 in). If two signal <del>lenses</del> indications are used, they shall be vertically aligned, except that they <del>may</del> shall be permitted to be horizontally aligned if the Speed Limit (R2-1) sign is longer horizontally than vertically. If two <del>signal lenses</del> indications are used, they shall be alternately flashed.</p> <p>OPTION A Speed Limit Sign Beacon may be used with a fixed or variable Speed Limit sign. If applicable, a flashing Speed Limit Sign Beacon (with an appropriate accompanying sign) may be used to indicate that the speed limit <del>shown</del> is in effect.</p> <p>A Speed Limit Sign Beacon may be included within the border of a School</p>	<p><b>Section 4L.04 Speed Limit Sign Beacon Standard:</b></p> <p>01 A Speed Limit Sign Beacon shall be used <b>only to supplement a Speed Limit sign.</b></p> <p>02 A Speed Limit Sign Beacon shall consist of <b>one or more signal sections of a standard traffic control signal face, with a flashing CIRCULAR YELLOW signal indication in each signal section. The signal indications shall have a nominal diameter of not less than 8 inches. If two signal indications are used, they shall be vertically aligned, except that they shall be permitted to be horizontally aligned if the Speed Limit (R2-1) sign is longer horizontally than vertically. If two signal indications are used, they shall be alternately flashed.</b></p> <p>Option:</p> <p>03 A Speed Limit Sign Beacon may be used with a fixed or variable Speed Limit sign. If applicable, a flashing Speed Limit Sign Beacon (with an appropriate accompanying sign) may be used to indicate that the displayed speed limit is in effect.</p> <p>04 A Speed Limit Sign Beacon may be included within the border of a School Speed Limit (S5-1) sign (see Section 7B.15).</p>	<p>used with a traffic signal warning sign (see Section 2C.36).</p> <p>4L.4 Speed Limit Sign Beacon STANDARD A Speed Limit Sign Beacon shall be used only to supplement a Speed Limit sign.</p> <p>A Speed Limit Sign Beacon shall consist of one or more signal sections of a standard traffic control signal face, with a flashing CIRCULAR YELLOW signal indication in each signal section. The signal indications shall have a nominal diameter of not less than 200 mm (8 in). If two signal indications are used, they shall be vertically aligned, except that they shall be permitted to be horizontally aligned if the Speed Limit (R2-1) sign is longer horizontally than vertically. If two signal indications are used, they shall be alternately flashed.</p> <p>OPTION A Speed Limit Sign Beacon may be used with a fixed or variable Speed Limit sign. If applicable, a flashing Speed Limit Sign Beacon (with an appropriate accompanying sign) may be used to indicate that the speed limit is in effect.</p>	<p>Changes OK, add new Mn text in bold</p>
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<p>Speed Limit (S5-1) sign (see Section 7B.15).</p> <p><b>SUPPORT</b>  <del>Section 7B.11 contains additional Options for the use of Speed Limit Sign Beacons with SCHOOL SPEED LIMIT signs.</del></p> <p><del>4K.5</del> 4L.5 Stop Beacon</p> <p>STANDARD  A Stop Beacon shall be used only to supplement a STOP sign, a DO NOT ENTER sign, or a WRONG WAY sign.</p> <p>A Stop Beacon shall consist of one or more signal sections of a standard traffic signal face with a flashing CIRCULAR RED signal indication in each signal section. If two horizontally aligned signal <del>lenses</del> indications are used for a Stop Beacon, they shall be flashed simultaneously to avoid being confused with a <del>highway-rail</del> grade crossing flashing-light signals. If two vertically aligned signal <del>lenses</del> indications are used for a Stop Beacon, they shall be flashed alternately. <b>Vertically aligned signal indications used for a Stop Beacon shall not be used to supplement a STOP sign.</b></p> <p>The bottom of the signal housing of a Stop Beacon shall be not less than 300 mm (12 in) nor more than 600 mm (24 in) above the top of a STOP sign (<del>see Section 2B.4</del>), a DO NOT ENTER sign, or a WRONG WAY sign.</p>	<p><b>Section 4L.05 Stop Beacon Standard:</b></p> <p>01 <b>A Stop Beacon shall be used only to supplement a STOP sign, a DO NOT ENTER sign, or a WRONG WAY sign.</b></p> <p>02 <b>A Stop Beacon shall consist of one or more signal sections of a standard traffic signal face with a flashing CIRCULAR RED signal indication in each signal section. If two horizontally aligned signal indications are used for a Stop Beacon, they shall be flashed simultaneously to avoid being confused with grade crossing flashing-light signals. If two vertically aligned signal indications are used for a Stop Beacon, they shall be flashed alternately.</b></p> <p>03 <b>The bottom of the signal housing of a Stop Beacon shall be not less than 12 inches or more than 24 inches above the top of a STOP sign, a DO NOT ENTER sign, or a WRONG WAY sign.</b></p>	<p>A Speed Limit Sign Beacon may be included within the border of a School Speed Limit (S5-1) sign (see Section 7B.15).</p> <p>4L.5 Stop Beacon</p> <p>STANDARD  A Stop Beacon shall be used only to supplement a STOP sign, a DO NOT ENTER sign, or a WRONG WAY sign.</p> <p>A Stop Beacon shall consist of one or more signal sections of a standard traffic signal face with a flashing CIRCULAR RED signal indication in each signal section. If two horizontally aligned signal indications are used for a Stop Beacon, they shall be flashed simultaneously to avoid being confused with grade crossing flashing- light signals. If two vertically aligned signal indications are used for a Stop Beacon, they shall be flashed alternately. <b>Vertically aligned signal indications used for a Stop Beacon shall not be used to supplement a STOP sign.</b></p> <p>The bottom of the signal housing of a Stop Beacon shall be not less than 300 mm (12 in) nor more than 600 mm (24 in) above the top of</p>	<p>Recommend making changes and leaving Mn text in bold</p>
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<p>CHAPTER <del>4J.4M</del> 4M LANE-USE CONTROL SIGNALS</p> <p>Section <del>4J.1</del> 4M.1 Application of Lane-Use Control Signals</p> <p>SUPPORT</p> <p>Lane-use control signals are special overhead signals that permit or prohibit the use of specific lanes of a street or highway or that indicate the impending prohibition of their use <b>or that warn traffic of existing or potentially hazardous conditions</b>. Lane-use control signals are distinguished by placement of special signal faces over a certain lane or lanes of the roadway and by their distinctive shapes and symbols. Supplementary signs are sometimes used to explain their meaning and intent.</p> <p>Lane-use control signals are most commonly used for reversible-lane control, but are also used in <b>certain</b> nonreversible <b>freeway</b> lane applications <b>and for toll plaza lanes</b> (see Section 4K.2).</p> <p>GUIDANCE</p> <p>An engineering study should be conducted to determine whether a reversible-lane operation can be controlled satisfactorily by static signs (see Section 2B.<del>25</del> 26) or whether lane-use control signals are necessary. Lane-use control signals should be used to control reversible-lane operations if any of the following conditions are present:</p> <p>A. More than one lane is reversed in direction;  B. Two-way or one-way left turns are allowed</p>	<p><b>CHAPTER 4M. LANE-USE CONTROL SIGNALS</b></p> <p><b>Section 4M.01 Application of Lane-Use Control Signals</b></p> <p>Support:</p> <p>01 Lane-use control signals are special overhead signals that permit or prohibit the use of specific lanes of a street or highway or that indicate the impending prohibition of their use. Lane-use control signals are distinguished by placement of special signal faces over a certain lane or lanes of the roadway and by their distinctive shapes and symbols. Supplementary signs are sometimes used to explain their meaning and intent.</p> <p>02 Lane-use control signals are most commonly used for reversible-lane control, but are also used in certain non-reversible lane applications and for toll plaza lanes (see Section 4K.02).</p> <p><i>Guidance:</i></p> <p>03 <i>An engineering study should be conducted to determine whether a reversible-lane operation can be controlled satisfactorily by static signs (see Section 2B.26) or whether lane-use control signals are necessary. Lane-use control signals should be used to control reversible-lane operations if any of the following conditions are present:</i></p> <p><i>A. More than one lane is reversed in direction;</i>  <i>B. Two-way or one-way left turns are allowed during peak-period reversible operations, but those turns are from a different lane than used during off-peak periods;</i>  <i>C. Other unusual or complex operations are included in the reversible-lane pattern;</i>  <i>D. Demonstrated crash experience occurring with reversible-lane operation controlled by</i></p>	<p>a STOP sign, a DO NOT ENTER sign, or a WRONG WAY sign.</p> <p>CHAPTER 4M LANE-USE CONTROL SIGNALS</p> <p>Section 4M.1 Application of Lane-Use Control Signals</p> <p>SUPPORT</p> <p>Lane-use control signals are special overhead signals that permit or prohibit the use of specific lanes of a street or highway or that indicate the impending prohibition of their use <b>or that warn traffic of existing or potentially hazardous conditions</b>. Lane-use control signals are distinguished by placement of special signal faces over a certain lane or lanes of the roadway and by their distinctive shapes and symbols. Supplementary signs are sometimes used to explain their meaning and intent.</p> <p>Lane-use control signals are most commonly used for reversible-lane control, but are also used in certain nonreversible lane applications and for toll plaza lanes (see Section 4K.2).</p> <p>GUIDANCE</p> <p>An engineering study should be conducted to</p>	<p>Relocated from 4J.2</p>
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<p>during peak-period reversible operations, but those turns are from a different lane than used during off-peak periods;</p> <p>C. Other unusual or complex operations are included in the reversible-lane pattern;</p> <p>D. Demonstrated crash experience occurring with reversible-lane operation controlled by static signs that can be corrected by using lane-use control signals at the times of transition between peak and off-peak patterns; and/or</p> <p>E. An engineering study indicates that <del>safer</del> <b>the safety</b> and <del>more efficient</del> <b>efficiency of the traffic operations</b> of a reversible-lane system would be <del>provided</del> <b>improved</b> by lane-use control signals.</p> <p>STANDARD:</p> <p>Pavement markings (see Section 3B.3) shall be used in conjunction with reversible-lane control signals.</p> <p>OPTION:</p> <p>Lane-use control signals <del>also may be used for reversible lane operations at toll booths. They</del> may also be used if there is no intent or need to reverse lanes, <b>but there is a need to indicate the open or closed status of one or more lanes, including such as:</b></p> <p>A. On a freeway, if it is desired to <del>keep traffic out of</del> <b>close</b> certain lanes at certain hours to facilitate the merging of traffic from a ramp or other freeway;</p> <p>B. On a freeway, near its terminus, to indicate a lane that ends;</p> <p>C. On a freeway or long bridge, to indicate that a lane may be temporarily blocked by</p>	<p><i>static signs that can be corrected by using lane-use control signals at the times of transition between peak and off-peak patterns; and/or</i></p> <p><i>E. An engineering study indicates that the safety and efficiency of the traffic operations of a reversible-lane system would be improved by lane-use control signals.</i></p> <p><b>Standard:</b>  <sup>04</sup> <b>Pavement markings (see Section 3B.03) shall be used in conjunction with reversible-lane control signals.</b></p> <p>Option:  <sup>05</sup> Lane-use control signals may also be used if there is no intent or need to reverse lanes, but there is a need to indicate the open or closed status of one or more lanes, such as:</p> <p>A. On a freeway, if it is desired to close certain lanes at certain hours to facilitate the merging of traffic from a ramp or other freeway;</p> <p>B. On a freeway, near its terminus, to indicate a lane that ends;</p> <p>C. On a freeway or long bridge, to indicate that a lane may be temporarily blocked by a crash, breakdown, construction or maintenance activities, or similar temporary conditions; and</p> <p>D. On a conventional road or driveway, at access or egress points to or from a facility, such as a parking garage, where one or more lanes of the access or egress are opened or closed at various times.</p>	<p>determine whether a reversible-lane operation can be controlled satisfactorily by static signs (see Section 2B.26) or whether lane-use control signals are necessary. Lane-use control signals should be used to control reversible-lane operations if any of the following conditions are present:</p> <p>A. More than one lane is reversed in direction;</p> <p>B. Two-way or one-way left turns are allowed during peak-period reversible operations, but those turns are from a different lane than used during off-peak periods;</p> <p>C. Other unusual or complex operations are included in the reversible-lane pattern;</p> <p>D. Demonstrated crash experience occurring with reversible-lane operation controlled by static signs that can be corrected by using lane-use control signals at the times of transition between peak and off-peak patterns; and/or</p> <p>E. An engineering study indicates that the safety and efficiency of the traffic operations of a reversible-lane system would be improved by lane-use control signals.</p> <p>STANDARD:</p> <p>Pavement markings (see Section 3B.3) shall be used in conjunction with reversible-lane control signals.</p> <p>OPTION:</p> <p>Lane-use control signals may also be used if there is no intent or need to reverse lanes, but there is a need to indicate the open or closed status of one or more lanes,</p>	<p>Recommend making changes and leaving Mn text in bold</p>
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<p>a crash, breakdown, construction or maintenance activities, <del>and so forth</del> or similar temporary conditions; and.</p> <p><b>D. On a freeway, to permit usage of a lane, while warning traffic of existing or potentially hazardous conditions; and</b></p> <p><b>E. On a conventional road or driveway, at access or egress points to or from a facility, such as a parking garage, where one or more lanes of the access or egress are opened or closed at various times.</b></p> <p><del>4J.2</del> <b>4M.2</b> Meaning of Lane-Use Control Signal Indications STANDARD</p> <p>The meanings of lane-use control signal indications <del>are</del> shall be as follows:</p> <p>A. A steady DOWNWARD GREEN ARROW signal indication shall mean that a road user is permitted to drive in the lane over which the arrow signal indication is located.</p> <p>B. A steady YELLOW X signal indication shall mean that a road user is to prepare to vacate, <del>in a reasonably safe manner,</del> the lane over which the signal indication is located because a lane control change is being made to a steady RED X signal indication.</p> <p>C. A steady WHITE TWO-WAY LEFT-TURN ARROW signal indication (see Figure <del>4J-1</del> <b>4M-1</b>) shall mean that a road user is permitted to use a lane over which the signal indication is located for a left turn, but not for through travel, with the understanding that common use of the lane by oncoming road users for left turns is also permitted.</p> <p>D. A steady WHITE ONE WAY LEFT-</p>	<p><b>Section 4M.02 Meaning of Lane-Use Control Signal Indications</b> <b>Standard:</b></p> <p><sup>01</sup> The meanings of lane-use control signal indications shall be as follows:</p> <p><b>A. A steady DOWNWARD GREEN ARROW signal indication shall mean that a road user is permitted to drive in the lane over which the arrow signal indication is located.</b></p> <p><b>B. A steady YELLOW X signal indication shall mean that a road user is to prepare to vacate the lane over which the signal indication is located because a lane control change is being made to a steady RED X signal indication.</b></p> <p><b>C. A steady WHITE TWO-WAY LEFT-TURN ARROW signal indication (see Figure 4M-1) shall mean that a road user is permitted to use a lane over which the signal indication is located for a left turn, but not for through travel, with the understanding that common use of the lane by oncoming road users for left turns is also permitted.</b></p> <p><b>D. A steady WHITE ONE WAY LEFT-TURN ARROW signal indication (see Figure 4M-1) shall mean that a road user is permitted to use a lane over which the signal indication is located for a left turn (without</b></p>	<p>such as:</p> <p>A. On a freeway, if it is desired to <del>keep traffic out of</del> close certain lanes at certain hours to facilitate the merging of traffic from a ramp or other freeway;</p> <p>B. On a freeway, near its terminus, to indicate a lane that ends;</p> <p>C. On a freeway or long bridge, to indicate that a lane may be temporarily blocked by a crash, breakdown, construction or maintenance activities, or similar temporary conditions; and.</p> <p><b>D. On a freeway, to permit usage of a lane, while warning traffic of existing or potentially hazardous conditions; and</b></p> <p><b>E. On a conventional road or driveway, at access or egress points to or from a facility, such as a parking garage, where one or more lanes of the access or egress are opened or closed at various times.</b></p> <p>4M.2 Meaning of Lane-Use Control Signal Indications STANDARD</p> <p>The meanings of lane-use control signal indications shall be as follows:</p> <p>A. A steady DOWNWARD GREEN ARROW signal indication shall mean that a road user is permitted to drive in the lane over which the arrow signal indication is located.</p> <p>B. A steady YELLOW X signal indication shall mean that a road user is to prepare to vacate the lane over which the signal indication is located because a lane control change is being made to a steady RED X signal indication.</p>	<p>Recommend leaving MN text</p>
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<p>TURN ARROW signal indication (see Figure <del>4J-1</del> 4M-1) shall mean that a road user is permitted to use a lane over which the signal indication is located for a left turn (without opposing turns in the same lane), but not for through travel.</p> <p><b>E. A steady DOWNWARD YELLOW ARROW signal indication shall mean that a road user should prepare to vacate, in a safe manner, the freeway lane over which the signal indication is located because a lane closure is being made, and to avoid occupying that lane when a steady RED X is displayed.</b></p> <p><b>F. A flashing DOWNWARD YELLOW ARROW signal indication shall mean that a road user is permitted to use the freeway lane over which the signal indication is located, while using extreme caution.</b></p> <p>G. A steady RED X signal indication shall mean that a road user is not permitted to use the lane over which the signal indication is located and that this signal indication shall modify accordingly the meaning of <del>all</del> other traffic controls present. <del>The road user shall obey all other traffic controls and follow normal safe driving practices.</del></p> <p><del>4J.3</del> 4M.3 Design of Lane-Use Control Signals</p> <p>STANDARD All lane-use control signal indications shall be in units with rectangular signal faces and shall have opaque backgrounds. Nominal minimum height and width of each DOWNWARD</p>	<p><b>opposing turns in the same lane), but not for through travel.</b></p> <p><b>E. A steady RED X signal indication shall mean that a road user is not permitted to use the lane over which the signal indication is located and that this signal indication shall modify accordingly the meaning of other traffic controls present.</b></p> <p><b>Section 4M.03 Design of Lane-Use Control Signals</b> <b>Standard:</b> 01 All lane-use control signal indications shall be in units with rectangular signal faces and shall have opaque backgrounds. Nominal minimum height and width of each <b>DOWNWARD GREEN ARROW, YELLOW X, and RED X signal face shall be 18 inches for typical applications. The</b></p>	<p>C. A steady WHITE TWO-WAY LEFT-TURN ARROW signal indication (see Figure 4M-1) shall mean that a road user is permitted to use a lane over which the signal indication is located for a left turn, but not for through travel, with the understanding that common use of the lane by oncoming road users for left turns is also permitted.</p> <p>D. A steady WHITE ONE WAY LEFT-TURN ARROW signal indication (see Figure 4M-1) shall mean that a road user is permitted to use a lane over which the signal indication is located for a left turn (without opposing turns in the same lane), but not for through travel.</p> <p><b>E. A steady DOWNWARD YELLOW ARROW signal indication shall mean that a road user should prepare to vacate, in a safe manner, the freeway lane over which the signal indication is located because a lane closure is being made, and to avoid occupying that lane when a steady RED X is displayed.</b></p> <p><b>F. A flashing DOWNWARD YELLOW ARROW signal indication shall mean that a road user is permitted to use the freeway lane over which the signal indication is located, while using extreme caution.</b></p> <p>G. A steady RED X signal indication shall mean that a road user is not permitted to use the lane over which the signal indication is located and that this signal indication shall modify accordingly the meaning of other traffic controls present.</p>	<p>Recommend adding new language and keeping minimum height at 17 feet.</p>
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<p>GREEN ARROW, YELLOW X, and RED X signal face shall be 450 mm (18 in) for typical applications. The WHITE TWO-WAY LEFT-TURN ARROW and WHITE ONE WAY LEFT-TURN ARROW signal faces shall have a nominal minimum height and width of 750 mm (30 in).</p> <p>Each lane to be reversed or closed shall have signal faces with a DOWNWARD GREEN ARROW and a RED X symbol.</p> <p>Each reversible lane that also operates as a two-way or one-way left-turn lane during certain periods shall have signal faces that also include the applicable WHITE TWO-WAY LEFT-TURN ARROW or WHITE ONE WAY LEFT-TURN ARROW symbol.</p> <p>Each nonreversible lane immediately adjacent to a reversible lane shall have signal indications that display a DOWNWARD GREEN ARROW to traffic traveling in the permitted direction and a RED X to traffic traveling in the opposite direction.</p> <p>If in separate signal sections, the relative positions, from left to right, of the signal indications shall be RED X, YELLOW X, DOWNWARD GREEN ARROW, WHITE TWO-WAY LEFT-TURN ARROW, WHITE ONE WAY LEFT-TURN ARROW.</p> <p>The color of lane-use control signal indications shall be clearly visible for 700 m (2,300 ft) at all times under normal atmospheric conditions, unless otherwise physically obstructed.</p> <p>Lane-use control signal faces shall be located approximately over the center of the lane</p>	<p><b>WHITE TWO-WAY LEFT-TURN ARROW and WHITE ONE WAY LEFT-TURN ARROW signal faces shall have a nominal minimum height and width of 30 inches.</b></p> <p>02 <b>Each lane to be reversed or closed shall have signal faces with a DOWNWARD GREEN ARROW and a RED X symbol.</b></p> <p>03 <b>Each reversible lane that also operates as a two-way or one-way left-turn lane during certain periods shall have signal faces that also include the applicable WHITE TWO-WAY LEFT-TURN ARROW or WHITE ONE WAY LEFT-TURN ARROW symbol.</b></p> <p>04 <b>Each non-reversible lane immediately adjacent to a reversible lane shall have signal indications that display a DOWNWARD GREEN ARROW to traffic traveling in the permitted direction and a RED X to traffic traveling in the opposite direction.</b></p> <p>05 <b>If in separate signal sections, the relative positions, from left to right, of the signal indications shall be RED X, YELLOW X, DOWNWARD GREEN ARROW, WHITE TWO-WAY LEFT-TURN ARROW, WHITE ONE WAY LEFT-TURN ARROW.</b></p> <p>06 <b>The color of lane-use control signal indications shall be clearly visible for 2,300 feet at all times under normal atmospheric conditions, unless otherwise physically obstructed.</b></p> <p>07 <b>Lane-use control signal faces shall be located approximately over the center of the lane controlled.</b></p> <p>08 <b>If the area to be controlled is more than 2,300 feet in length, or if the vertical or horizontal alignment is curved, intermediate</b></p>	<p>4M.3 Design of Lane-Use Control Signals</p> <p>STANDARD</p> <p>All lane-use control signal indications shall be in units with rectangular signal faces and shall have opaque backgrounds. Nominal minimum height and width of each DOWNWARD GREEN ARROW, YELLOW X, and RED X signal face shall be 450 mm (18 in) for typical applications. The WHITE TWO-WAY LEFT-TURN ARROW and WHITE ONE WAY LEFT-TURN ARROW signal faces shall have a nominal minimum height and width of 750 mm (30 in).</p> <p>Each lane to be reversed or closed shall have signal faces with a DOWNWARD GREEN ARROW and a RED X symbol.</p> <p>Each reversible lane that also operates as a two-way or one-way left-turn lane during certain periods shall have signal faces that also include the applicable WHITE TWO-WAY LEFT-TURN ARROW or WHITE ONE WAY LEFT-TURN ARROW symbol.</p> <p>Each nonreversible lane immediately adjacent to a reversible lane shall have signal indications that display a DOWNWARD GREEN ARROW to traffic traveling in the permitted direction and a RED X to traffic traveling in the opposite direction.</p> <p>If in separate signal sections, the relative positions, from left to right, of the signal indications shall be RED X, YELLOW X,</p>	<p>Paragraphs moved</p> <p>Removed paragraph number</p>
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<p>controlled.</p> <p>If the area to be controlled is more than 700 m (2,300 ft) in length, or if the vertical or horizontal alignment is curved, intermediate lane-use control signal faces shall be located over each controlled lane at frequent intervals. This location shall be such that road users will at all times be able to see at least one signal indication and preferably two along the roadway, and will have a definite indication of the lanes specifically reserved for their use.</p> <p>All lane-use control signal faces shall be located in a straight line across the roadway approximately at right angles to the roadway alignment.</p> <p>On roadways having intersections controlled by traffic control signals, the lane-use control signal face shall be located sufficiently far in advance of or beyond such traffic control signals to prevent them from being misconstrued as traffic control signals.</p> <p><a href="#">Except as provided in following following paragraph, ¶</a>the bottom of the signal housing of any lane-use control signal face shall be <del>at least a minimum of 17 feet 4.6 m (15 ft) but not more than</del> and a maximum of 5.8 m (19 ft) above the pavement grade.</p> <p><b>OPTION</b></p> <p><a href="#">The bottlm of a lane-use control signa housing may be lower than 17 fee above the pavement if it is mounted on a canopy or other structure over the pavement, but not lower than the vertical clearance of the structure.</a></p> <p><a href="#">Except for lane-use control signals at toll</a></p>	<p><b>lane-use control signal faces shall be located over each controlled lane at frequent intervals. This location shall be such that road users will at all times be able to see at least one signal indication and preferably two along the roadway, and will have a definite indication of the lanes specifically reserved for their use.</b></p> <p><b>09 All lane-use control signal faces shall be located in a straight line across the roadway approximately at right angles to the roadway alignment.</b></p> <p><b>10 On roadways having intersections controlled by traffic control signals, the lane-use control signal face shall be located sufficiently far in advance of or beyond such traffic control signals to prevent them from being misconstrued as traffic control signals.</b></p> <p><b>11 Except as provided in Paragraph 12, the bottom of the signal housing of any lane-use control signal face shall be a minimum of 15 feet and a maximum of 19 feet above the pavement grade.</b></p> <p>Option:</p> <p>12 The bottom of a lane-use control signal housing may be lower than 15 feet above the pavement if it is mounted on a canopy or other structure over the pavement, but not lower than the vertical clearance of the structure.</p> <p>13 Except for lane-use control signals at toll plazas (see Section 4K.02), in areas with minimal visual clutter and with speeds of less than 40 mph, lane-use control signal faces with nominal height and width of 12 inches may be used for the DOWNWARD GREEN ARROW, YELLOW X, and RED X signal faces, and lane-use control signal faces with nominal height and width of 18 inches may be used for the WHITE TWO-WAY LEFT-TURN ARROW and WHITE ONE-WAY LEFT-</p>	<p>DOWNWARD GREEN ARROW, WHITE TWO-WAY LEFT-TURN ARROW, WHITE ONE WAY LEFT-TURN ARROW.</p> <p>The color of lane-use control signal indications shall be clearly visible for 700 m (2,300 ft) at all times under normal atmospheric conditions, unless otherwise physically obstructed.</p> <p>Lane-use control signal faces shall be located approximately over the center of the lane controlled.</p> <p>If the area to be controlled is more than 700 m (2,300 ft) in length, or if the vertical or horizontal alignment is curved, intermediate lane-use control signal faces shall be located over each controlled lane at frequent intervals. This location shall be such that road users will at all times be able to see at least one signal indication and preferably two along the roadway, and will have a definite indication of the lanes specifically reserved for their use.</p> <p>All lane-use control signal faces shall be located in a straight line across the roadway approximately at right angles to the roadway alignment.</p> <p>On roadways having intersections controlled by traffic control signals, the lane-use control signal face shall be located sufficiently far in advance of or beyond such traffic control signals to prevent them from being misconstrued as traffic control signals.</p> <p>Except as provided in following following paragraph, the bottom of the signal housing of any lane-use control signal face shall be a minimum of 17 feet and a maximum of 5.8 m</p>	<p>reference</p> <p>Paragraph removed regarding yellow on opaque background. Didn't find relocated anywhere</p>
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<p>plazas (see Section 4K.02), in <del>in</del> areas with minimal visual clutter and with speeds of less than 70 km/h or less than 40 mph, lane-use control signal faces with nominal height and width of 300 mm (12 in) may be used for the DOWNWARD GREEN ARROW, YELLOW X, and RED X signal faces, and lane-use control signal faces with nominal height and width of 450 mm (18 in) may be used for the WHITE TWO-WAY LEFT-TURN ARROW and WHITE ONE-WAY LEFT-TURN ARROW signal faces.</p> <p>Other sizes of lane-use control signal faces larger than 450 mm (18 in) with message recognition distances appropriate to signal spacing may be used for the DOWNWARD GREEN ARROW, YELLOW X, and RED X signal faces.</p> <p><del>Signal faces with a YELLOW X symbol on an opaque background may be used as described in Section 4I.4.</del></p> <p>Nonreversible lanes not immediately adjacent to a reversible lane on any street so controlled may also be provided with signal indications that display a DOWNWARD GREEN ARROW to traffic traveling in the permitted direction and a RED X to traffic traveling in the opposite direction.</p> <p>The signal indications provided for each lane may be in separate signal sections or may be superimposed in the same signal section.</p> <p><del>4J.4</del> <b>4M.4</b> Operation of Lane-Use Control Signals</p>	<p>TURN ARROW signal faces.</p> <p>14 Other sizes of lane-use control signal faces larger than 18 inches with message recognition distances appropriate to signal spacing may be used for the DOWNWARD GREEN ARROW, YELLOW X, and RED X signal faces.</p> <p>15 Non-reversible lanes not immediately adjacent to a reversible lane on any street so controlled may also be provided with signal indications that display a DOWNWARD GREEN ARROW to traffic traveling in the permitted direction and a RED X to traffic traveling in the opposite direction.</p> <p>16 The signal indications provided for each lane may be in separate signal sections or may be superimposed in the same signal section.</p> <p><b>Section 4M.04 Operation of Lane-Use Control Signals Standard:</b></p> <p>01 <b>All lane-use control signals shall be coordinated so that all the signal indications</b></p>	<p>(19 ft) above the pavement grade.</p> <p>OPTION</p> <p>The bottom of a lane-use control signal housing may be lower than 17 feet above the pavement if it is mounted on a canopy or other structure over the pavement, but not lower than the vertical clearance of the structure.</p> <p>Except for lane-use control signals at toll plazas (see Section 4K.02), in areas with minimal visual clutter and with speeds of less than 70 km/h or less than 40 mph, lane-use control signal faces with nominal height and width of 300 mm (12 in) may be used for the DOWNWARD GREEN ARROW, YELLOW X, and RED X signal faces, and lane-use control signal faces with nominal height and width of 450 mm (18 in) may be used for the WHITE TWO-WAY LEFT-TURN ARROW and WHITE ONE-WAY LEFT-TURN ARROW signal faces.</p> <p>Other sizes of lane-use control signal faces larger than 450 mm (18 in) with message recognition distances appropriate to signal spacing may be used for the DOWNWARD GREEN ARROW, YELLOW X, and RED X signal faces.</p> <p>Nonreversible lanes not immediately adjacent to a reversible lane on any street so controlled may also be provided with signal indications that display a DOWNWARD GREEN ARROW to traffic traveling in the permitted direction and a RED X to traffic traveling in the opposite direction.</p> <p>The signal indications provided for each lane may be in separate signal sections or may be</p>	<p>Recommend changes leaving Mn Text in bold</p>
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<p><b>STANDARD</b></p> <p>All lane-use control signals shall be coordinated so that all the signal indications along the controlled section of roadway are operated uniformly and consistently. The lane-use control signal system shall be designed to reliably guard against showing any prohibited combination of signal indications to any traffic at any point in the controlled lanes.</p> <p>For reversible-lane control signals, the following combination of signal indications shall not be <b>shown</b> simultaneously <b>displayed</b> over the same lane to both directions of travel:</p> <ul style="list-style-type: none"> <li>A. DOWNWARD GREEN ARROW in both directions;</li> <li>B. YELLOW X in both directions;</li> <li>C. WHITE ONE WAY LEFT-TURN ARROW in both directions;</li> <li>D. DOWNWARD GREEN ARROW in one direction and YELLOW X in the other direction;</li> <li>E. WHITE TWO-WAY LEFT-TURN ARROW or WHITE ONE WAY LEFT-TURN ARROW in one direction and DOWNWARD GREEN ARROW in the other direction;</li> <li>F. WHITE TWO-WAY LEFT-TURN ARROW in one direction and WHITE ONE WAY LEFT-TURN ARROW in the other direction; and</li> <li>G. WHITE ONE WAY LEFT-TURN ARROW in one direction and YELLOW X in the other direction.</li> </ul> <p>A moving condition in one direction shall be terminated either by the immediate display of a RED X signal indication or by</p>	<p><b>along the controlled section of roadway are operated uniformly and consistently. The lane-use control signal system shall be designed to reliably guard against showing any prohibited combination of signal indications to any traffic at any point in the controlled lanes.</b></p> <p><b>02 For reversible-lane control signals, the following combination of signal indications shall not be simultaneously displayed over the same lane to both directions of travel:</b></p> <ul style="list-style-type: none"> <li><b>A. DOWNWARD GREEN ARROW in both directions,</b></li> <li><b>B. YELLOW X in both directions,</b></li> <li><b>C. WHITE ONE WAY LEFT-TURN ARROW in both directions,</b></li> <li><b>D. DOWNWARD GREEN ARROW in one direction and YELLOW X in the other direction,</b></li> <li><b>E. WHITE TWO-WAY LEFT-TURN ARROW or WHITE ONE WAY LEFT-TURN ARROW in one direction and DOWNWARD GREEN ARROW in the other direction,</b></li> <li><b>F. WHITE TWO-WAY LEFT-TURN ARROW in one direction and WHITE ONE WAY LEFT-TURN ARROW in the other direction, and</b></li> <li><b>G. WHITE ONE WAY LEFT-TURN ARROW in one direction and YELLOW X in the other direction.</b></li> </ul> <p><b>03 A moving condition in one direction shall be terminated either by the immediate display of a RED X signal indication or by a YELLOW X signal indication followed by a RED X signal indication. In either case, the duration of the RED X signal indication shall be sufficient to allow clearance of the lane before any moving condition is allowed in the opposing direction.</b></p>	<p>superimposed in the same signal section.</p> <p>4M.4 Operation of Lane-Use Control Signals</p> <p><b>STANDARD</b></p> <p>All lane-use control signals shall be coordinated so that all the signal indications along the controlled section of roadway are operated uniformly and consistently. The lane-use control signal system shall be designed to reliably guard against showing any prohibited combination of signal indications to any traffic at any point in the controlled lanes.</p> <p>For reversible-lane control signals, the following combination of signal indications shall not be simultaneously displayed over the same lane to both directions of travel:</p> <ul style="list-style-type: none"> <li>A. DOWNWARD GREEN ARROW in both directions;</li> <li>B. YELLOW X in both directions;</li> <li>C. WHITE ONE WAY LEFT-TURN ARROW in both directions;</li> <li>D. DOWNWARD GREEN ARROW in one direction and YELLOW X in the other direction;</li> <li>E. WHITE TWO-WAY LEFT-TURN ARROW or WHITE ONE WAY LEFT-TURN ARROW in one direction and DOWNWARD GREEN ARROW in the other direction;</li> <li>F. WHITE TWO-WAY LEFT-TURN</li> </ul>	
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<p>a YELLOW X signal indication followed by a RED X signal indication. In either case, the duration of the RED X signal indication shall be sufficient to allow clearance of the lane before any moving condition is allowed in the opposing direction.</p> <p>Whenever a DOWNWARD GREEN ARROW signal indication is changed to a WHITE TWO-WAY LEFT-TURN ARROW signal indication, the RED X signal indication shall continue to be displayed to the opposite direction of travel for an appropriate duration to allow traffic time to vacate the lane being converted to a two-way left-turn lane.</p> <p>If an automatic control system is used, a manual control to override the automatic control shall be provided.</p> <p><b>OPTION</b>  <b>A steady DOWNWARD YELLOW ARROW may be used on a freeway or a long bridge as a transition between a steady DOWNWARD GREEN ARROW and a steady RED X. A flashing DOWNWARD YELLOW ARROW may be used on a freeway or long bridge as a warning signal to indicate a lane or lanes where existing or potentially hazardous conditions require that traffic use the lane with caution.</b></p> <p>Guidance:  The type of control provided for reversible-lane operation should be such as to permit either automatic or manual operation of the lane-use control signals.</p>	<p><b>04 Whenever a DOWNWARD GREEN ARROW signal indication is changed to a WHITE TWO-WAY LEFT-TURN ARROW signal indication, the RED X signal indication shall continue to be displayed to the opposite direction of travel for an appropriate duration to allow traffic time to vacate the lane being converted to a two-way left-turn lane.</b></p> <p><b>05 If an automatic control system is used, a manual control to override the automatic control shall be provided.</b></p> <p><i>Guidance:</i>  06 <i>The type of control provided for reversible-lane operation should be such as to permit either automatic or manual operation of the lane-use control signals.</i></p> <p><b>Standard:</b>  07 <b>If used, lane-use control signals shall be operated continuously, except that lane-use control signals that are used only for special events or other infrequent occurrences and lane-use control signals on non-reversible freeway lanes shall be permitted to be darkened when not in operation. The change from normal operation to non-operation shall occur only when the lane-use control signals display signal indications that are appropriate for the lane use that applies when the signals are not operated. The lane-use control signals shall display signal indications that are appropriate for the existing lane use when changed from non-operation to normal operations. Also, traffic control devices shall clearly indicate the proper lane use when the lane control signals are not in operation.</b></p> <p>Support:  08 Section 2B.26 contains additional information concerning considerations</p>	<p>ARROW in one direction and WHITE ONE WAY LEFT-TURN ARROW in the other direction; and</p> <p>G. WHITE ONE WAY LEFT-TURN ARROW in one direction and YELLOW X in the other direction.</p> <p>A moving condition in one direction shall be terminated either by the immediate display of a RED X signal indication or by a YELLOW X signal indication followed by a RED X signal indication. In either case, the duration of the RED X signal indication shall be sufficient to allow clearance of the lane before any moving condition is allowed in the opposing direction.</p> <p>Whenever a DOWNWARD GREEN ARROW signal indication is changed to a WHITE TWO-WAY LEFT-TURN ARROW signal indication, the RED X signal indication shall continue to be displayed to the opposite direction of travel for an appropriate duration to allow traffic time to vacate the lane being converted to a two-way left-turn lane.</p> <p>If an automatic control system is used, a manual control to override the automatic control shall be provided.</p> <p><b>OPTION</b>  <b>A steady DOWNWARD YELLOW ARROW may be used on a freeway or a long bridge as a transition between a steady DOWNWARD GREEN ARROW and a steady RED X. A flashing DOWNWARD YELLOW ARROW may be used on a freeway or long bridge as a warning signal to indicate a lane or lanes where existing or</b></p>	
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<p><b>STANDARD</b></p> <p>If used, lane-use control signals shall be operated continuously, except that lane-use control signals that are used only for special events or other infrequent occurrences and lane-use control signals on nonreversible freeway lanes <del>may</del> shall be permitted to be darkened when not in operation. The change from normal operation to nonoperation shall occur only when the lane-use control signals display signal indications that are appropriate for the lane use that applies when the signals are not operated. The lane-use control signals shall display signal indications that are appropriate for the existing lane use when changed from nonoperation to normal operations. Also, traffic control devices shall clearly indicate the proper lane use when the lane control signals are not in operation.</p> <p><b>SUPPORT</b></p> <p>Section 2B.2526 contains additional information concerning considerations involving left-turn prohibitions in conjunction with reversible-lane operations.</p> <p><b>CHAPTER 4L.4N IN-ROADWAY LIGHTS</b></p> <p><del>4L.1</del> 4N.1 Application of In-Roadway Lights</p> <p><b>SUPPORT</b></p> <p>In-Roadway Lights are special types of highway traffic signals installed in the roadway</p>	<p>involving left-turn prohibitions in conjunction with reversible-lane operations.</p> <p><b>CHAPTER 4N. IN-ROADWAY LIGHTS</b></p> <p><b>Section 4N.01 Application of In-Roadway Lights</b></p> <p>Support:</p> <p>01 In-Roadway Lights are special types of highway traffic signals installed in the roadway surface to warn road users that they are approaching a condition on or adjacent to the</p>	<p><b>potentially hazardous conditions require that traffic use the lane with caution.</b></p> <p>Guidance:</p> <p>The type of control provided for reversible-lane operation should be such as to permit either automatic or manual operation of the lane-use control signals.</p> <p><b>STANDARD</b></p> <p>If used, lane-use control signals shall be operated continuously, except that lane-use control signals that are used only for special events or other infrequent occurrences and lane-use control signals on nonreversible freeway lanes shall be permitted to be darkened when not in operation. The change from normal operation to nonoperation shall occur only when the lane-use control signals display signal indications that are appropriate for the lane use that applies when the signals are not operated. The lane-use control signals shall display signal indications that are appropriate for the existing lane use when changed from nonoperation to normal operations. Also, traffic control devices shall clearly indicate the proper lane use when the lane control signals are not in operation.</p> <p><b>SUPPORT</b></p> <p>Section 2B.26 contains additional information concerning considerations involving left-turn prohibitions in conjunction with reversible-lane operations.</p>	<p>Recommend changes</p>
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<p>surface to warn road users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop. This includes, <del>but is not necessarily limited to,</del> situations warning of marked school crosswalks, marked midblock crosswalks, marked crosswalks on uncontrolled approaches, marked crosswalks in advance of roundabouts <del>intersections</del> as described in <del>Sections 3B.24 and 3B.25</del> Chapter 3C, and other roadway situations involving pedestrian crossings.</p> <p><b>STANDARD</b> In-Roadway Lights shall not be used for any application that is not described in this Chapter. If used, In-Roadway Lights shall not exceed a height of 19 mm (0.75 in) above the roadway surface. When used, In-Roadway Lights shall be flashed and shall not be steadily illuminated.</p> <p><b>SUPPORT</b> Steadily illuminated lights installed in the roadway surface are considered to be internally illuminated raised pavement markers (see Section 3B.11).</p> <p><b>OPTION</b> <del>The flash rate for</del> In-Roadway Lights may be <del>different from the flash rate of standard beacons.</del> Flashed in a manner that includes a continuous flash of varying intensity and time duration that is repeated to provide a flickering effect (see Section 4N.2).</p> <p><del>4L.2</del> 4N.2 In-Roadway Warning Lights at</p>	<p>roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop. This includes situations warning of marked school crosswalks, marked midblock crosswalks, marked crosswalks on uncontrolled approaches, marked crosswalks in advance of roundabouts as described in Chapter 3C, and other roadway situations involving pedestrian crossings.</p> <p><b>Standard:</b> 02 <b>In-Roadway Lights shall not be used for any application that is not described in this Chapter.</b> 03 <b>If used, In-Roadway Lights shall not exceed a height of 3/4 inch above the roadway surface.</b> 04 <b>When used, In-Roadway Lights shall be flashed and shall not be steadily illuminated.</b></p> <p>Support: 05 Steadily illuminated lights installed in the roadway surface are considered to be internally illuminated raised pavement markers (see Section 3B.11). Option: 06 In-Roadway Lights may be flashed in a manner that includes a continuous flash of varying intensity and time duration that is repeated to provide a flickering effect (see Section 4N.02).</p> <p><b>Section 4N.02 In-Roadway Warning Lights at Crosswalks</b> Option:</p>	<p><b>CHAPTER 4N IN-ROADWAY LIGHTS</b></p> <p>4N.1 Application of In-Roadway Lights</p> <p><b>SUPPORT</b> In-Roadway Lights are special types of highway traffic signals installed in the roadway surface to warn road users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop. This includes situations warning of marked school crosswalks, marked midblock crosswalks, marked crosswalks on uncontrolled approaches, marked crosswalks in advance of roundabouts as described in Chapter 3C, and other roadway situations involving pedestrian crossings.</p> <p><b>STANDARD</b> In-Roadway Lights shall not be used for any application that is not described in this Chapter. If used, In-Roadway Lights shall not exceed a height of 19 mm (0.75 in) above the roadway surface. When used, In-Roadway Lights shall be flashed and shall not be steadily illuminated.</p> <p><b>SUPPORT</b> Steadily illuminated lights installed in the roadway surface are considered to be internally illuminated raised pavement markers (see Section 3B.11).</p> <p><b>OPTION</b> In-Roadway Lights may be flashed in a manner that includes a continuous flash of varying</p>	<p>Recommend changes</p> <p>Change language referring to paragraph numbers</p>
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<p>Crosswalks</p> <p><b>OPTION</b> In-Roadway lights may be installed at certain marked crosswalks, based on an engineering study or engineering judgment, to provide additional warning to road users.</p> <p><b>STANDARD</b> If used, In-Roadway Warning Lights at crosswalks shall be installed only at marked crosswalks with applicable warning signs. They shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.</p> <p>If In-Roadway Warning Lights are used at a crosswalk, the following requirements shall apply:</p> <p>A. <del>If used, In-Roadway Warning Lights at crosswalks</del> Except as provided in Options A and B below, they shall be installed along both sides of the crosswalk and shall span its entire length.</p> <p>B. <del>If used, In-Roadway Warning Lights at crosswalks</del> They shall initiate operation based on pedestrian actuation and shall cease operation at a predetermined time after the pedestrian actuation or, with passive detection, after the pedestrian clears the crosswalk.</p> <p>C. <del>If used, In-Roadway Warning Lights at crosswalks</del> They shall display a flashing yellow <del>signal indication</del> light when actuated. The flash rate <del>for In-Roadway Warning Lights at crosswalks</del> shall be at least 50, but not more than 60, flash periods per minute. <del>The flash rate</del> If they</p>	<p>01 In-roadway lights may be installed at certain marked crosswalks, based on an engineering study or engineering judgment, to provide additional warning to road users.</p> <p><b>Standard:</b></p> <p>02 <b>If used, In-Roadway Warning Lights at crosswalks shall be installed only at marked crosswalks with applicable warning signs. They shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.</b></p> <p>03 <b>If In-Roadway Warning Lights are used at a crosswalk, the following requirements shall apply:</b></p> <p><b>A. Except as provided in Paragraphs 7 and 8, they shall be installed along both sides of the crosswalk and shall span its entire length.</b></p> <p><b>B. They shall initiate operation based on pedestrian actuation and shall cease operation at a predetermined time after the pedestrian actuation or, with passive detection, after the pedestrian clears the crosswalk.</b></p> <p><b>C. They shall display a flashing yellow light when actuated. The flash rate shall be at least 50, but no more than 60, flash periods per minute. If they are flashed in a manner that includes a continuous flash of varying intensity and time duration that is repeated to provide a flickering effect, the flickers or pulses shall not repeat at a rate that is between 5 and 30 per second to avoid frequencies that might cause seizures.</b></p> <p><b>D. They shall be installed in the area between the outside edge of the crosswalk line and 10 feet from the outside edge of the crosswalk.</b></p> <p><b>E. They shall face away from the crosswalk if unidirectional, or shall face away from</b></p>	<p>intensity and time duration that is repeated to provide a flickering effect (see Section 4N.2).</p> <p>4N.2 In-Roadway Warning Lights at Crosswalks</p> <p><b>OPTION</b> In-Roadway lights may be installed at certain marked crosswalks, based on an engineering study or engineering judgment, to provide additional warning to road users.</p> <p><b>STANDARD</b> If used, In-Roadway Warning Lights at crosswalks shall be installed only at marked crosswalks with applicable warning signs. They shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.</p> <p>If In-Roadway Warning Lights are used at a crosswalk, the following requirements shall apply:</p> <p>C. Except as provided in Options A and B below, they shall be installed along both sides of the crosswalk and shall span its entire length.</p> <p>D. They shall initiate operation based on pedestrian actuation and shall cease operation at a predetermined time after the</p>	<p>and add option letters to refer to</p>
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are flashed in a manner that includes a continuous flash of varying intensity and time duration that is repeated to provide a flickering effect, the flickers or pulses shall not ~~be repeat~~ at a rate that is between 5 and 30 ~~flashes~~ per second to avoid frequencies that might cause seizures.

D. ~~If used, In-Roadway Warning Lights~~ They shall be installed in the area between the outside edge of the crosswalk line and 3 m (10 ft) from the outside edge of the crosswalk.

E. ~~In-Roadway Warning Lights~~ They shall face away from the crosswalk if unidirectional, or shall face away from and across the crosswalk if bidirectional.

If used on one-lane, one-way roadways, a minimum of two In-Roadway Warning Lights shall be installed on the approach side of the crosswalk. If used on two-lane roadways, a minimum of three In-Roadway Warning Lights shall be installed along both sides of the crosswalk. If used on roadways with more than two lanes, a minimum of one In-Roadway Warning Light per lane shall be installed along both sides of the crosswalk.

#### GUIDANCE

If used, In-Roadway Warning Lights should be installed in the center of each travel lane, at the ~~centerline~~ center line of the roadway, at each edge of the roadway or parking lanes, or at other suitable locations away from the normal tire track paths.

The location of the In-Roadway Warning Lights within the lanes should be based on engineering judgment.

**and across the crosswalk if bidirectional.**

04 **If used on one-lane, one-way roadways, a minimum of two In-Roadway Warning Lights shall be installed on the approach side of the crosswalk. If used on two-lane roadways, a minimum of three In-Roadway Warning Lights shall be installed along both sides of the crosswalk. If used on roadways with more than two lanes, a minimum of one In-Roadway Warning Light per lane shall be installed along both sides of the crosswalk.**

*Guidance:*

05 *If used, In-Roadway Warning Lights should be installed in the center of each travel lane, at the center line of the roadway, at each edge of the roadway or parking lanes, or at other suitable locations away from the normal tire track paths.*

06 *The location of the In-Roadway Warning Lights within the lanes should be based on engineering judgment.*

*Option:*

07 On one-way streets, In-Roadway Warning Lights may be omitted on the departure side of the crosswalk.

08 Based on engineering judgment, the In-Roadway Warning Lights on the departure side of the crosswalk on the left side of a median may be omitted.

09 Unidirectional In-Roadway Warning Lights installed at crosswalk locations may have an optional, additional yellow light indication in each unit that is visible to pedestrians in the crosswalk to indicate to pedestrians in the crosswalk that the In-Roadway Warning Lights are in fact flashing as they cross the street. These yellow lights may flash with and at the same flash rate as the light module in which each is installed.

pedestrian actuation or, with passive detection, after the pedestrian clears the crosswalk.

- E. They shall display a flashing yellow light when actuated. The flash rate shall be at least 50, but no more than 60, flash periods per minute. If they are flashed in a manner that includes a continuous flash of varying intensity and time duration that is repeated to provide a flickering effect, the flickers or pulses shall not repeat at a rate that is between 5 and 30 per second to avoid frequencies that might cause seizures.
- F. They shall be installed in the area between the outside edge of the crosswalk line and 3 m (10 ft) from the outside edge of the crosswalk.
- G. They shall face away from the crosswalk if unidirectional, or shall face away from and across the crosswalk if bidirectional.

If used on one-lane, one-way roadways, a minimum of two In-Roadway Warning Lights shall be installed on the approach side of the crosswalk. If used on two-lane roadways, a minimum of three In-Roadway Warning Lights shall be installed along both sides of the crosswalk. If used on roadways with more than two lanes, a minimum of one In-Roadway Warning Light per lane shall be installed along both sides of the crosswalk.

#### GUIDANCE

If used, In-Roadway Warning Lights should be installed in the center of each travel lane, at the center line of the roadway, at each edge of the roadway or parking lanes, or at other suitable locations away from the normal tire track paths.

<p><b>OPTION</b></p> <p><b>A.</b> On one-way streets, In-Roadway Warning Lights may be omitted on the departure side of the crosswalk.</p> <p><b>B.</b> Based on engineering judgment, the In-Roadway Warning Lights on the departure side of the crosswalk on the left side of a median may be omitted.</p> <p><b>C.</b> Unidirectional In-Roadway Warning Lights installed at crosswalk locations may have an optional, additional yellow light indication in each unit that is visible to pedestrians in the crosswalk to indicate to pedestrians in the crosswalk that the In-Roadway Warning Lights are in fact flashing as they cross the street. These yellow lights may flash with and at the same flash rate as the light module in which each is installed.</p> <p><b>GUIDANCE</b></p> <p>If used, the period of operation of the In-Roadway Warning Lights following each actuation should be sufficient to allow a pedestrian crossing in the crosswalk to leave the curb or shoulder and travel at a <del>normal</del> walking speed of <del>1.2 m (4 ft)</del> 3.5 feet per second to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait. Where pedestrians who walk slower than <del>normal</del> 3.5 feet per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than <del>1.2 m (4 ft)</del> 3.5 feet per second should be considered in determining the period of operation.</p> <p><b>STANDARD</b></p> <p>If pedestrian pushbuttons are used to actuate the In-Roadway lights, a <b>PUSH BUTTON TO TURN ON WARNING LIGHTS</b> (with</p>	<p><i>Guidance:</i></p> <p><i>10 If used, the period of operation of the In-Roadway Warning Lights following each actuation should be sufficient to allow a pedestrian crossing in the crosswalk to leave the curb or shoulder and travel at a walking speed of 3.5 feet per second to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait. Where pedestrians who walk slower than 3.5 feet per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 3.5 feet per second should be considered in determining the period of operation.</i></p> <p><b>Standard:</b></p> <p><b>11 If pedestrian pushbuttons are used to actuate the in-roadway lights, a Push Button To Turn On Warning Lights (with pushbutton symbol) (R10-25) sign (see Figure 2B-26) shall be mounted adjacent to or integral with each pedestrian pushbutton.</b></p> <p><b>12 Where the period of operation is sufficient only for crossing from a curb or shoulder to a median of sufficient width for pedestrians to wait, median-mounted pedestrian actuators shall be provided.</b></p>	<p>The location of the In-Roadway Warning Lights within the lanes should be based on engineering judgment.</p> <p><b>OPTION</b></p> <p><b>A.</b> On one-way streets, In-Roadway Warning Lights may be omitted on the departure side of the crosswalk.</p> <p><b>B.</b> Based on engineering judgment, the In-Roadway Warning Lights on the departure side of the crosswalk on the left side of a median may be omitted.</p> <p><b>C.</b> Unidirectional In-Roadway Warning Lights installed at crosswalk locations may have an optional, additional yellow light indication in each unit that is visible to pedestrians in the crosswalk to indicate to pedestrians in the crosswalk that the In-Roadway Warning Lights are in fact flashing as they cross the street. These yellow lights may flash with and at the same flash rate as the light module in which each is installed.</p> <p><b>GUIDANCE</b></p> <p>If used, the period of operation of the In-Roadway Warning Lights following each actuation should be sufficient to allow a pedestrian crossing in the crosswalk to leave the curb or shoulder and travel at a walking speed of 3.5 feet per second to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait. Where pedestrians who walk slower than 3.5 feet per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 3.5 feet per second should be considered in determining the period of operation.</p> <p><b>STANDARD</b></p>	<p>Following sections are all Mn language. Recommend</p>
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pushbutton symbol) (R10-25) sign (see Figure 2B-26) shall be mounted adjacent to or integral with each pedestrian pushbutton.

Where the period of operation is sufficient only for crossing from a curb or shoulder to a median of sufficient width for pedestrians to wait, ~~additional measures should be considered, such as~~ median-mounted pedestrian actuators shall be provided.

~~In-Roadway Warning Lights at crosswalks may use pedestrian detectors to determine the duration of the operation instead of ceasing operation after a predetermined time.~~

CHAPTER ~~4M~~ 4O ADVANCE  
WARNING FLASHERS

~~4M.1~~ 4O.1 Description

SUPPORT

**The Advanced Warning Flasher (AWF) is a device which, at certain high speed locations, has been found to provide additional information to the motorist describing the operation of the traffic signal. It has been found that and Advance Warning Flasher can assist the driver in making safer and more efficient driving decisions. The additional information includes a visual indication to get the driver's attention and a specific notice that the driver must prepare to stop. The Minnesota Advance Warning Flasher**

If pedestrian pushbuttons are used to actuate the In-Roadway lights, a PUSH BUTTON TO TURN ON WARNING LIGHTS (with pushbutton symbol) (R10-25) sign (see Figure 2B-26) shall be mounted adjacent to or integral with each pedestrian pushbutton.

Where the period of operation is sufficient only for crossing from a curb or shoulder to a median of sufficient width for pedestrians to wait, median-mounted pedestrian actuators shall be provided.

CHAPTER ~~4M~~ 4O ADVANCE  
WARNING FLASHERS

~~4M.1~~ 4O.1 Description

SUPPORT

**The Advanced Warning Flasher (AWF) is a**

keeping with changes shown to fit into rest of chapter.

(Do we use O in this document or intentionally leave blank and go to P?)

system consists of a flasher and a sign located on main street approaches to a high speed signalized intersection. The AWF is connected to the traffic signal in such a way that when the main street green is about to change to yellow, the flasher is turned on to warn the approaching drivers of the impending change. Basically, the purpose of an optimally designed combination of traffic signal and Advance Warning Flasher system is twofold: 1) to inform the driver in advance of a required drive decision (prepare to stop) and 2) to minimize the number of drivers that will be required to make that decision. The amount of time, prior to the signal turning yellow, that the Advance Warning Flasher flashes is know as Leading Flash Period.

OPTION

Advance Warning Flashers may be used at traffic signals.

~~4M.2~~ 4O.2 General Design and Operation

STANDARD

If used, the Advance Warning Flasher assembly shall be as shown in Figure ~~4M-1~~ 4O-1. The flasher shall flash yellow in a alternating manner prior to the termination of the green, and during the yellow and red periods of the signal. The flasher shall also flash if the signal goes into flashing mode.

GUIDANCE

If used, then the following should apply:  
Advance Warning Flasher - The Advance Warning Flasher power should be supplied from the signal control cabinet.  
Advance Warning Flasher Sign Placement -

device which, at certain high speed locations, has been found to provide additional information to the motorist describing the operation of the traffic signal. It has been found that and Advance Warning Flasher can assist the driver in making safer and more efficient driving decisions. The additional information includes a visual indication to get the driver's attention and a specific notice that the driver must prepare to stop.

The Minnesota Advance Warning Flasher system consists of a flasher and a sign located on main street approaches to a high speed signalized intersection. The AWF is connected to the traffic signal in such a way that when the main street green is about to change to yellow, the flasher is turned on to warn the approaching drivers of the impending change. Basically, the purpose of an optimally designed combination of traffic signal and Advance Warning Flasher system is twofold: 1) to inform the driver in advance of a required drive decision (prepare to stop) and 2) to minimize the number of drivers that will be required to make that decision. The amount of time, prior to the signal turning yellow, that the Advance Warning Flasher flashes is know as Leading Flash Period.

OPTION

Advance Warning Flashers may be used at traffic signals.

4O.2 General Design and Operation

STANDARD

If used, the Advance Warning Flasher assembly shall be as shown in Figure 4O-1.

The Advance Warning Flasher should be set back from the intersection in accordance with Table ~~4M-1~~ 4O-1. Where this is not possible, the leading flash should be adjusted for the actual distance by using the formula below. At locations on four-lane divided roadways, it should be placed on both sides of the approach.

**Leading Flash Period - The Advance Warning Flasher should flash prior to the termination of the green for the Leading Flash Period shown in Table ~~4M-1~~ 4O-1. For existing systems where the placement is other than what is listed in Table ~~4M-1~~ 4O-1, the Leading Flash Period should be computed by the following formula:**

**Detector Placement - The detection of the intersection should be determined without regard to the Advance Warning Flasher.**

## CHAPTER ~~4N~~ 4P TRAFFIC CONTROL SIGNALS FOR DIVIDED HIGHWAYS

### ~~4N-1~~ 4P.1 Design Requirements for Divided Highways

#### SUPPORT

According to Minnesota Statute 2004, Chapter 169.01, subd. 36b “Where a highway includes two roadways 30 feet or more apart, then every crossing of each roadway of such divided highway by an intersecting highway shall be regarded as a separate intersection. In the event such intersecting highway also includes two roadways 30 feet or more apart, then every crossing of two roadways of such highways shall be regarded as a separate intersection.”

The flasher shall flash yellow in a alternating manner prior to the termination of the green, and during the yellow and red periods of the signal. The flasher shall also flash if the signal goes into flashing mode.

#### GUIDANCE

**If used, then the following should apply:**  
**Advance Warning Flasher - The Advance Warning Flasher power should be supplied from the signal control cabinet.**  
**Advance Warning Flasher Sign Placement - The Advance Warning Flasher should be set back from the intersection in accordance with Table 4O-1. Where this is not possible, the leading flash should be adjusted for the actual distance by using the formula below. At locations on four-lane divided roadways, it should be placed on both sides of the approach.**  
**Leading Flash Period - The Advance Warning Flasher should flash prior to the termination of the green for the Leading Flash Period shown in Table 4O-1. For existing systems where the placement is other than what is listed in Table 4O-1, the Leading Flash Period should be computed by the following formula:**

**Detector Placement - The detection of the intersection should be determined without regard to the Advance Warning Flasher.**

## CHAPTER 4P TRAFFIC CONTROL SIGNALS FOR DIVIDED HIGHWAYS

### 4P.1 Design Requirements for Divided Highways

#### SUPPORT

<p><b>It is often undesirable to have vehicles stop between the two separate roadways of a divided highway. It is also often impractical to signalize the two crossings of the divided highway as two separate intersections, each meeting the requirements of Chapter 4D. This chapter lists the requirements for signalizing such separate intersections as a single entity.</b></p> <p><b>STANDARD</b>  <b>Signalization of an intersection of a divided highway with an intersecting roadway, where:</b></p> <p><b>a. the divided on-way roadways (including all traveled lanes at the intersection) are separated by 10 m (30 feet) or more, and</b>  <b>b. the highway has been determined to be operationally undesirable to hold vehicles (by signal indication) between the one-way roadways shall meet the requirements of this chapter.</b></p> <p><b>Except as specified in this chapter, Traffic Control Signals for divided highways shall meet the requirements of Chapter 4D.</b></p> <p><b>There shall be a minimum of three signal faces for the intersecting roadway traffic facing each approach at the intersection with the divided highway.</b></p> <p><b>GUIDANCE</b>  <b>Traffic on the intersecting roadway should be allowed to proceed through both intersections with the one-way roadways after being given a green indication. This traffic should not be stopped between the one-way roadways upon termination of the intersecting roadway green interval.</b></p>		<p><b>According to Minnesota Statute 2004, Chapter 169.01, subd. 36b “Where a highway includes two roadways 30 feet or more apart, then every crossing of each roadway of such divided highway by an intersecting highway shall be regarded as a separate intersection. In the event such intersecting highway also includes two roadways 30 feet or more apart, then every crossing of two roadways of such highways shall be regarded as a separate intersection.”</b></p> <p><b>It is often undesirable to have vehicles stop between the two separate roadways of a divided highway. It is also often impractical to signalize the two crossings of the divided highway as two separate intersections, each meeting the requirements of Chapter 4D. This chapter lists the requirements for signalizing such separate intersections as a single entity.</b></p> <p><b>STANDARD</b>  <b>Signalization of an intersection of a divided highway with an intersecting roadway, where:</b></p> <p><b>a. the divided on-way roadways (including all traveled lanes at the intersection) are separated by 10 m (30 feet) or more, and</b>  <b>b. the highway has been determined to be operationally undesirable to hold vehicles (by signal indication) between the one-way roadways shall meet the requirements of this chapter.</b></p> <p><b>Except as specified in this chapter, Traffic Control Signals for divided highways shall meet the requirements of Chapter 4D.</b></p> <p><b>There shall be a minimum of three signal</b></p>	
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<p>Left turning vehicles from the mainline roadway should be allowed to proceed through both intersections with the one-way roadways after being given a green indication. This traffic should not be stopped between the one-way roadways upon termination of the left turn movement's green interval.</p> <p>When there is no left turn phasing for the intersecting roadway, the following should apply (see Figure <del>4N-1</del> 4P-1):</p> <ul style="list-style-type: none"> <li>a. one signal face should be mounted on the divided highway median at the right side of the near one-way roadway intersection;</li> <li>b. one signal face should be mounted at the far left corner of the second one-way roadway intersection;</li> <li>c. one signal face should be overhead mounted at the far side of the second one-way roadway intersection.</li> </ul> <p>When there is left turn phasing for the intersecting roadway, the following should apply (see Figure <del>4N-2</del> 4P-2):</p> <ul style="list-style-type: none"> <li>a. one through signal face should be mounted on the divided highway median at the right side of the near one-way roadway intersection;</li> <li>b. one through signal face should be overhead mounted at the far side of the second one-way roadway intersection;</li> <li>c. one through signal face should be pole-mounted at the far right corner of the second one-way roadway intersection;</li> <li>d. one left turn phase signal face should be mounted at the far left corner of the second one-way roadway intersection;</li> <li>e. one left turn phase signal face should be</li> </ul>		<p>faces for the intersecting roadway traffic facing each approach at the intersection with the divided highway.</p> <p>GUIDANCE</p> <p>Traffic on the intersecting roadway should be allowed to proceed through both intersections with the one-way roadways after being given a green indication. This traffic should not be stopped between the one-way roadways upon termination of the intersecting roadway green interval.</p> <p>Left turning vehicles from the mainline roadway should be allowed to proceed through both intersections with the one-way roadways after being given a green indication. This traffic should not be stopped between the one-way roadways upon termination of the left turn movement's green interval.</p> <p>When there is no left turn phasing for the intersecting roadway, the following should apply (see Figure 4P-1):</p> <ul style="list-style-type: none"> <li>a. one signal face should be mounted on the divided highway median at the right side of the near one-way roadway intersection;</li> <li>b. one signal face should be mounted at the far left corner of the second one-way roadway intersection;</li> <li>c. one signal face should be overhead mounted at the far side of the second one-way roadway intersection.</li> </ul> <p>When there is left turn phasing for the intersecting roadway, the following should apply (see Figure 4P-2):</p> <ul style="list-style-type: none"> <li>a. one through signal face should be mounted on the divided highway median at</li> </ul>	
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<p><b>overhead mounted at the far side of the second one-way roadway intersection.</b></p> <p><b>OPTION</b>  <b>The signal faces indicated as overhead in the above Guidance, may be pole-mounted instead, if through engineering judgment it is determined that overhead mounting is not justified.</b></p> <p><b>When the overhead mounted left turn phase signal face is located more than 45 m (150 feet) from the stop line, the mast arm pole assembly may be moved to the divided highway median.</b></p> <p><b>STANDARD</b>  <b>When the left turn phasing is protected/permissive the overhead left turn and through face shall be combined into one five-section signal face. The far left corner signal face shall also be a five-section signal face.</b></p> <p><b>OPTION</b>  <b>When the distance between intersections of a divided highway becomes more than 18 m (60 feet), it may be desirable to provide supplemental signal faces and special operations and/or phasing.</b></p> <p><b>STANDARD</b>  <b>The signal faces required by this section shall conform to the same requirements as the signal faces required by section 4D-15.</b></p>		<p><b>the right side of the near one-way roadway intersection;</b></p> <p><b>b. one through signal face should be overhead mounted at the far side of the second one-way roadway intersection;</b></p> <p><b>c. one through signal face should be pole-mounted at the far right corner of the second one-way roadway intersection;</b></p> <p><b>d. one left turn phase signal face should be mounted at the far left corner of the second one-way roadway intersection;</b></p> <p><b>e. one left turn phase signal face should be overhead mounted at the far side of the second one-way roadway intersection.</b></p> <p><b>OPTION</b>  <b>The signal faces indicated as overhead in the above Guidance, may be pole-mounted instead, if through engineering judgment it is determined that overhead mounting is not justified.</b></p> <p><b>When the overhead mounted left turn phase signal face is located more than 45 m (150 feet) from the stop line, the mast arm pole assembly may be moved to the divided highway median.</b></p> <p><b>STANDARD</b>  <b>When the left turn phasing is protected/permissive the overhead left turn and through face shall be combined into one five-section signal face. The far left corner signal face shall also be a five-section signal face.</b></p> <p><b>OPTION</b>  <b>When the distance between intersections of a divided highway becomes more than 18 m (60 feet), it may be desirable to provide</b></p>	
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		<p><b>supplemental signal faces and special operations and/or phasing.</b></p> <p>STANDARD  <b>The signal faces required by this section shall conform to the same requirements as the signal faces required by section 4D.</b></p> <p>Figures 4D-a through 4D-d are Mn figures move them to section 4D.27.1. Update to show symbol for Flashing Yellow Arrow (FYA) Figure 4D-b should show 4 section FYA head along with the 5 section head</p> <p>Remove Figures 4E-3 and 4E-4 from manual</p>	<p>Drawings are not to scale and with maybe one exception they can not be built as shown. Let language stating where to put the pushbuttons stand alone.</p>
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