National Committee on
Uniform Traffic Control Devices

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Item No.: 20B-TTC-01

NCUTCD Proposal for Changes to the Manual on Uniform Traffic Control Devices

TECHNICAL COMMITTEE:	Temporary Traffic Control Technical Committee
ITEM NUMBER:	20B-TTC-01
TOPIC:	Typical Application Refinement and Stopping Sight Distance
ORIGIN OF REQUEST:	Craig Rhodes (TTC technical committee)
AFFECTED SECTIONS OF THE MUTCD:	Section 6E.07 Notes for Figure 6H-10 Notes for Figure 6H-24, Figure 6H-24 Figure 6H-27 Notes for Figure 6H-30, Figure 6H-30 Notes for Figure 6H-31, Figure 6H-31 Notes for Figure 6H-35 Notes for Figure 6H-40 Notes for Figure 6H-44
TASK FORCE MEMBERS:	Ryan Lancaster (chair), Craig Rhodes, Tim Baughman, Neil Boudreau, David Church, Dave Royer, Jim Bragdon, Fred Hanscom, Charles Adams, Laura Huizinga, Tom Macchione, Scott Tison, John Leonard

DEVELOPMENT HISTORY:

- Approved by Task Force: 04/14/2020
- Approved by Technical Committee: 06/17/2020
- Revisions from sponsor comments approved by Task Force: 01/05/2021
- Revisions from sponsor comments approved by Technical Committee: 01/13/2021
- Approved by NCUTCD Council: 01/20/2021

This is a proposal for recommended changes to the MUTCD that has been approved by the NCUTCD Council. This proposal does not represent a revision of the MUTCD and does not constitute official MUTCD standards, guidance, or options. It will be submitted to FHWA for consideration for inclusion in a future MUTCD revision. The MUTCD can be revised only through the federal rulemaking process.

SUMMARY:

One section and eight typical applications (TAs) are proposed to be revised. The proposed revisions address flagging, arrow board placement, and buffer spaces and address consistency across the typical applications.

DISCUSSION

The following describes proposed revisions to Section 6E.07 and temporary traffic control Typical Applications 10, 24, 27, 30, 31, 35, 40, and 44 of Chapter 6H.

Section 6E.07

P07 and P08 are redundant with Section 6C.11 and are proposed to be deleted.

Typical Application 10

Note 2 is proposed to be revised to be consistent with Section 6C.11 and the proposed note in Typical Application 27. A revision to note 5 is proposed to modify "sight distance" to "stopping sight distance" for consistency with other sections of Part 6 and revisions proposed to typical applications.

Typical Application 24

For consistency with proposed revisions to TA-30 and TA-31, a new standard note is proposed to indicate that the space behind an arrow board cannot be used as buffer space. The previously council approved Figure 6H-24 is proposed to be revised to remove the "buffer space" note on the left side of the figure and replace it with the new note. The text "(optional)" is added adjacent to the END ROAD WORK signs to be consistent with other typical applications.

Typical Application 27

Typical Application 27 describes flagger control in the notes and shows flagger symbol signs in Figure 6H-27, but the flagger symbol is absent from the figure. The flagger symbol is added to the four intersection approaches for consistency with other typical applications that involve flagger control. The other typical applications showing flaggers include TA-10, TA-13, TA-14, and TA-46. Several items, such as extraneous dimension lines and a misplaced channelizing device in the intersection, are proposed to be cleaned up and removed from the figure. The text "(optional)" is added adjacent to the END ROAD WORK signs to be consistent with other typical applications.

Typical Application 30

Currently in typical application 30, note 1 indicates that the typical application is for "low-speed, low volume urban streets" and that use of the LEFT LANE CLOSED XX FT sign is an option to be used "where speed or volume is higher." However, multi-lane streets are typically not low volume, and often not low speed.

For consistency with other typical applications involving multi-lane streets and divided highways with lane closures, note 1 is deleted and the LEFT LANE CLOSED AHEAD sign shown on Figure 6H-30. These other typical applications showing a lane closed include TA-21, TA-22 (as approved by Council on in June 2014), TA-23, TA-24 (as approved by Council on in June 2014), TA-25 (as approved by Council on in June 2014), TA-33, TA-34, TA-37, TA-38 (as approved by Council on in January 2019), TA-39, TA-42, TA-44, and TA-45. Some states have made these revisions to their state MUTCD.

The task force and TTC technical committee determined that the location of the work vehicle and truck-mounted attenuator shown on Figure 6H-30 should be upstream of the work space instead of next to the work space. In the figure, the work space was widened to encompass both interior lanes with work vehicles and truck-mounted attenuators shown upstream of the work space in the respective lanes.

Arrow boards are shown on Figure 6H-30 as optional with optional buffer spaces downstream of the arrow boards. To correlate with the buffer space principles described in Section 6C.06, P06 through P13, the arrow boards have been moved to the opposing interior lanes and behind channelizing devices and a new Standard note has been added to indicate that if an arrow board is used in the closed lane, then the longitudinal space downstream of the arrow board cannot be used as a buffer space. Another note, an option note, is added to indicate that arrow boards may be vehicle-mounted.

Typical Application 31

Similar to Typical Application 30, note 4 (originally note 3) of Typical Application 31 gives an option to use the LEFT LANE CLOSED XX FT where there are "high speeds." For the same reasons as for Typical Application 30, note 4 is deleted and a LEFT LANE CLOSED AHEAD sign is added to Figure 6H-31.

In the 2009 MUTCD, an arrow board is shown on Figure 6H-31 as optional with an optional buffer space downstream of the arrow board. To correlate with the buffer space principles described in Section 6C.06, P06 through P13, a new Standard note has been added to indicate that if an arrow board is used in the closed lane, then the longitudinal space downstream of the arrow board cannot be used as a buffer space. Another note, an option note, is added to indicate that arrow boards may be vehicle-mounted. The word "illustrated" is not needed and is proposed to be deleted from note 9 (originally note 8). END ROAD WORK signs with the note "(optional)" and additional channelizing devices are proposed to be added in addition to the LEFT LANE CLOSED XX FT sign. The END ROAD WORK signs are added for consistency with other typical applications.

Typical Application 35

A revision to note 8 is proposed to delete "adequate" and replace it with "stopping" in its reference to sight distance. The deletion and replacement clarifies the necessary sight distance and makes the note consistent with other sections of Part 6 and revisions proposed to typical applications.

Typical Application 40

A revision to note 4 (numbering from 19B-TTC-02, originally note 3) is proposed to delete "adequate" and replace it with "stopping" in its reference to sight distance. The deletion and replacement clarifies the necessary sight distance and makes the note consistent with other sections of Part 6 and revisions proposed to typical applications.

Typical Application 44

A revision to note 3 is proposed to delete "adequate" and replace it with "stopping" in its reference to sight distance. The deletion and replacement clarifies the necessary sight distance

and makes the note consistent with other sections of Part 6 and revisions proposed to typical applications.

RECOMMENDED MUTCD CHANGES

The following present the proposed changes to the current MUTCD within the context of the current MUTCD language. Proposed additions to the MUTCD are shown in blue underline and proposed deletions from the MUTCD are shown in ~~red strikethrough~~. Changes previously approved by NCUTCD Council (but not yet adopted by FHWA) are shown in green double underline for additions and ~~green double strikethrough~~ for deletions. In some cases, background comments may be provided with the MUTCD text. These comments are indicated by [black font in brackets highlighted light blue].

PART 6. TEMPORARY TRAFFIC CONTROL

CHAPTER 6E. FLAGGER CONTROL

Section 6E.07 Flagger Procedures

[Section 6E.07 has 8 paragraphs. Only paragraphs 06 through 08 are shown]

Guidance:

06 *The flagger should stand either on the shoulder adjacent to the road user being controlled or in the closed lane prior to stopping road users. A flagger should only stand in the lane being used by moving road users after road users have stopped. The flagger should be clearly visible to the first approaching road user at all times.*

The flagger also should be visible to other road users. The flagger should be stationed sufficiently in advance of the workers to warn them (for example, with audible warning devices such as horns or whistles) of approaching danger by out-of-control vehicles. The flagger should stand alone, away from other workers, work vehicles, or equipment.

~~Option:~~

~~07 At spot lane closures where adequate sight distance is available for the reasonably safe handling of traffic, the use of one flagger may be sufficient.~~

~~*Guidance:*~~

~~08 *When a single flagger is used, the flagger should be stationed on the shoulder opposite the spot lane closure or work space, or in a position where good visibility and traffic control can be maintained at all times.*~~

CHAPTER 6H. TYPICAL APPLICATIONS

Section 6H.01 Typical Applications

Notes for Figure 6H-10 – Typical Application 10
Lane Closure on a Two-Lane Road Using Flaggers

Option:

1. Positive protection devices may be used per Section 6F.84a. [approved by Council 01/10/2020]

~~1.~~2. ~~For low-volume situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger, positioned to be visible to road users approaching from both directions, may be used~~ A single flagger may be used on straight roadways with low-volumes when road users on both approaches have stopping sight distance to the flagger station (see ~~Chapter 6E~~ Section 6C.11).

~~2.~~3. The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short-duration operations.

~~3.~~4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs. A BE PREPARED TO STOP sign may be added to the sign series.

Guidance:

~~4.~~*5. The buffer space should be extended so that the two-way traffic taper is placed before a horizontal (or crest vertical) curve to provide ~~adequate~~ stopping sight distance for the flagger and a queue of stopped vehicles.*

Standard:

~~5.~~**6. At night, flagger stations shall be illuminated, except in emergencies.**

Guidance:

~~6.~~*7. When used, the BE PREPARED TO STOP sign should be located between the Flagger sign and the ONE LANE ROAD sign.*

~~7.~~*8. When a grade crossing exists within or upstream of the transition area and it is anticipated that queues resulting from the lane closure might extend through the grade crossing, the TTC zone should be extended so that the transition area precedes the grade crossing.*

~~8.~~*9. When a grade crossing equipped with active warning devices exists within the activity area, provisions should be made for keeping flaggers informed as to the activation status of these warning devices.*

~~9.~~*10. When a grade crossing exists within the activity area, drivers operating on the left-hand side of the normal center line should be provided with comparable warning devices as for drivers operating on the right-hand side of the normal center line.*

~~10.~~*11. Early coordination with the railroad company or light rail transit agency should occur before work starts.*

Option:

~~11.~~12. A flagger or a uniformed law enforcement officer may be used at the grade crossing to minimize the probability that vehicles are stopped within 15 feet of the grade crossing, measured from both sides of the outside rails.

Notes for Figure 6H-24—Typical Application 24
Half Road Closure on the Far Side of an Intersection

Guidance:

1. *If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.*
2. *When turn prohibitions are implemented, two turn prohibition signs should be used, one on the near side and, space permitting, one on the far side of the intersection.*
3. *Arrow boards should be used to advise approaching traffic of a lane closure in any of the following situations: high traffic volumes, high speeds, limited sight distances, or conditions where road users are less likely to expect such lane closures (see Section 6F.61).*

Option:

~~3.~~4. Positive protection devices may be used per Section 6F.84a. [approved by Council 01/10/2020]

~~4.~~5. A buffer space may be used between opposing directions of vehicular traffic as shown in this application.

Standard:

6. If an arrow board is used in the closed lane, the longitudinal distance downstream of the arrow board shall not be used as buffer space.

Option:

~~4.~~7. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection, as shown. ~~However,~~ When this results in the closure of a right-hand lane having ~~if there is a~~ significant right-turning movement, then the right-hand lane may be restricted to right turns only requiring through traffic to utilize the left lane~~, as shown~~. [Approved by NCUTCD Council, June 2014]

~~5.~~8. Where the turning radius is large, a right-turn island using channelizing devices or pavement markings may be used.

~~6.~~9. There may be insufficient space to place the back-to-back Keep Right sign and No Left Turn symbol signs at the end of the row of channelizing devices separating opposing vehicular traffic flows. In this situation, the No Left Turn symbol sign may be placed on the right and the Keep Right sign may be omitted.

~~7.~~10. For intersection approaches reduced to a single lane, left-turning movements may be prohibited to maintain capacity for through vehicular traffic.

~~8.~~11. Flashing warning lights and/or flags may be used to call attention to advance warning signs.

~~9.~~12. Temporary pavement markings may be used to delineate the travel path through the intersection.

~~10.~~13. If "dimension A" is not available to create a temporary right-turn lane, the installation of continuous channelizers from the end of the taper to the intersection may occur. As a result, the "RIGHT-LANE MUST TURN RIGHT" signs would not be installed. [approved by Council June 2014]

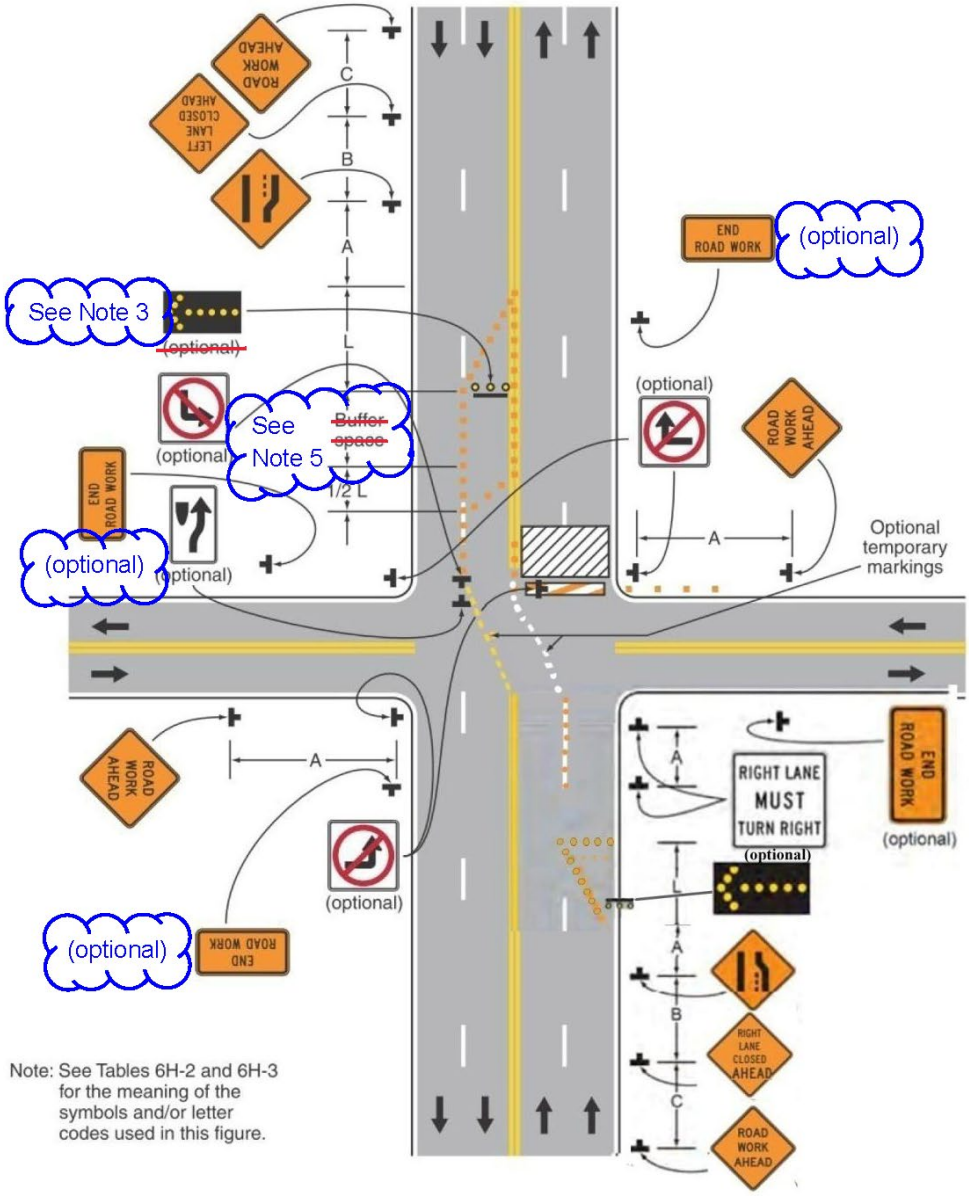
~~Support:~~

~~10. Keeping the right-hand lane open increases the through capacity by eliminating right turns from the open through lane.~~

~~11. A temporary turn island reinforces the nature of the temporary exclusive right-turn lane and enables a second RIGHT LANE MUST TURN RIGHT sign to be placed in the island.~~ [approved by Council June 2014]

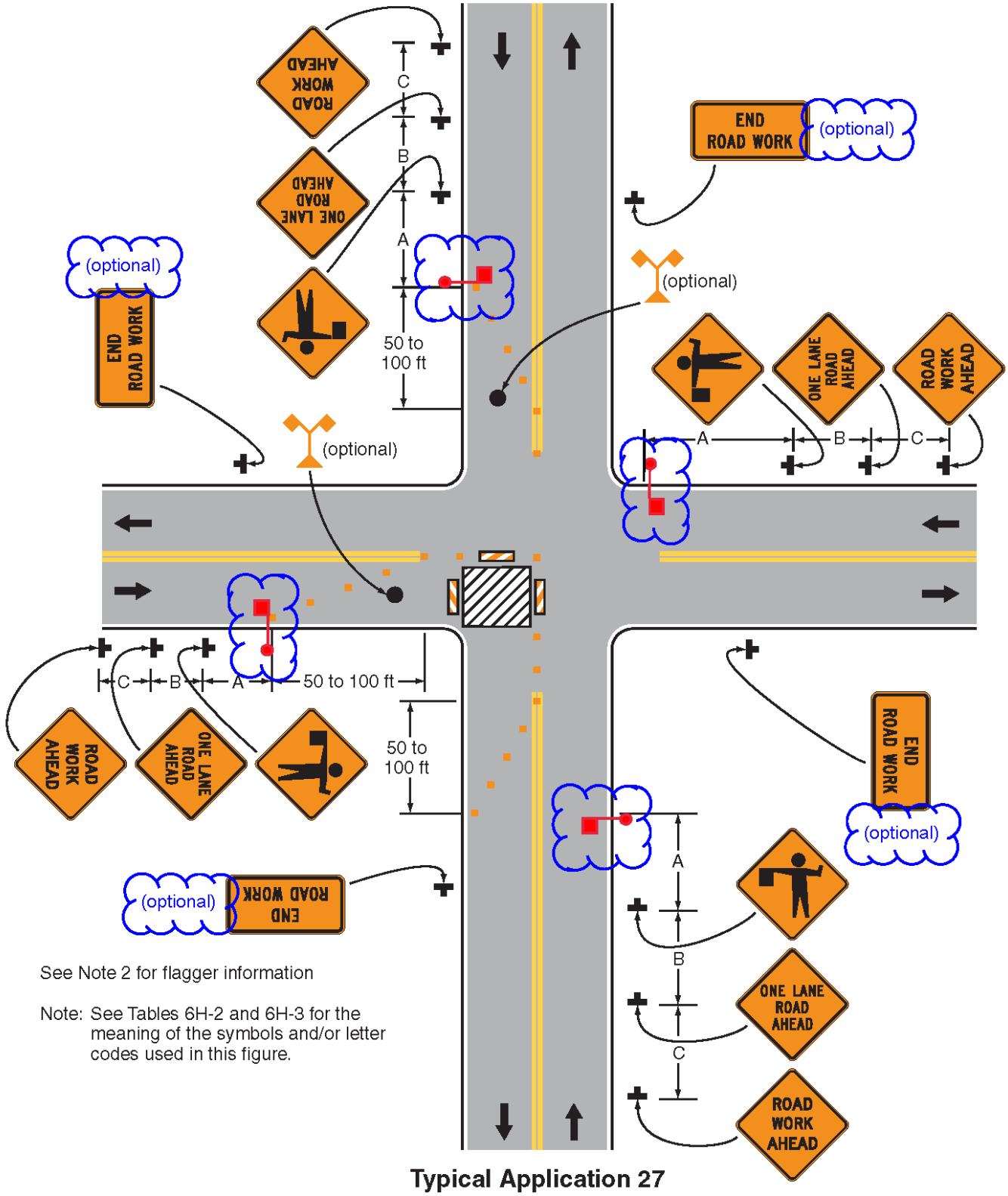
Figure 6H-24. Half Road Closure on the Far Side of an Intersection (TA-24)

[Figure previously approved by NCUTCD Council, June 2014]



Typical Application 24

Figure 6H-27. Closure at the Side of an Intersection (TA-27)



See Note 2 for flagger information

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 27

Notes for Figure 6H-30 – Typical Application 30
Interior Lane Closure on a Multi-Lane Street

Guidance:

~~*1. This information applies to low-speed, low-volume urban streets. Where speed or volume is higher, additional signing such as LEFT LANE CLOSED XX FT should be used between the signs shown.*~~

1. Arrow boards should be used to advise approaching traffic of a lane closure in any of the following situations: high traffic volumes, high speeds, limited sight distances, or conditions where road users are less likely to expect such lane closures (see Section 6F.61).

Standard:

2. If an arrow board is used in the closed lane, the longitudinal distance downstream of the arrow board shall not be used as buffer space.

Option:

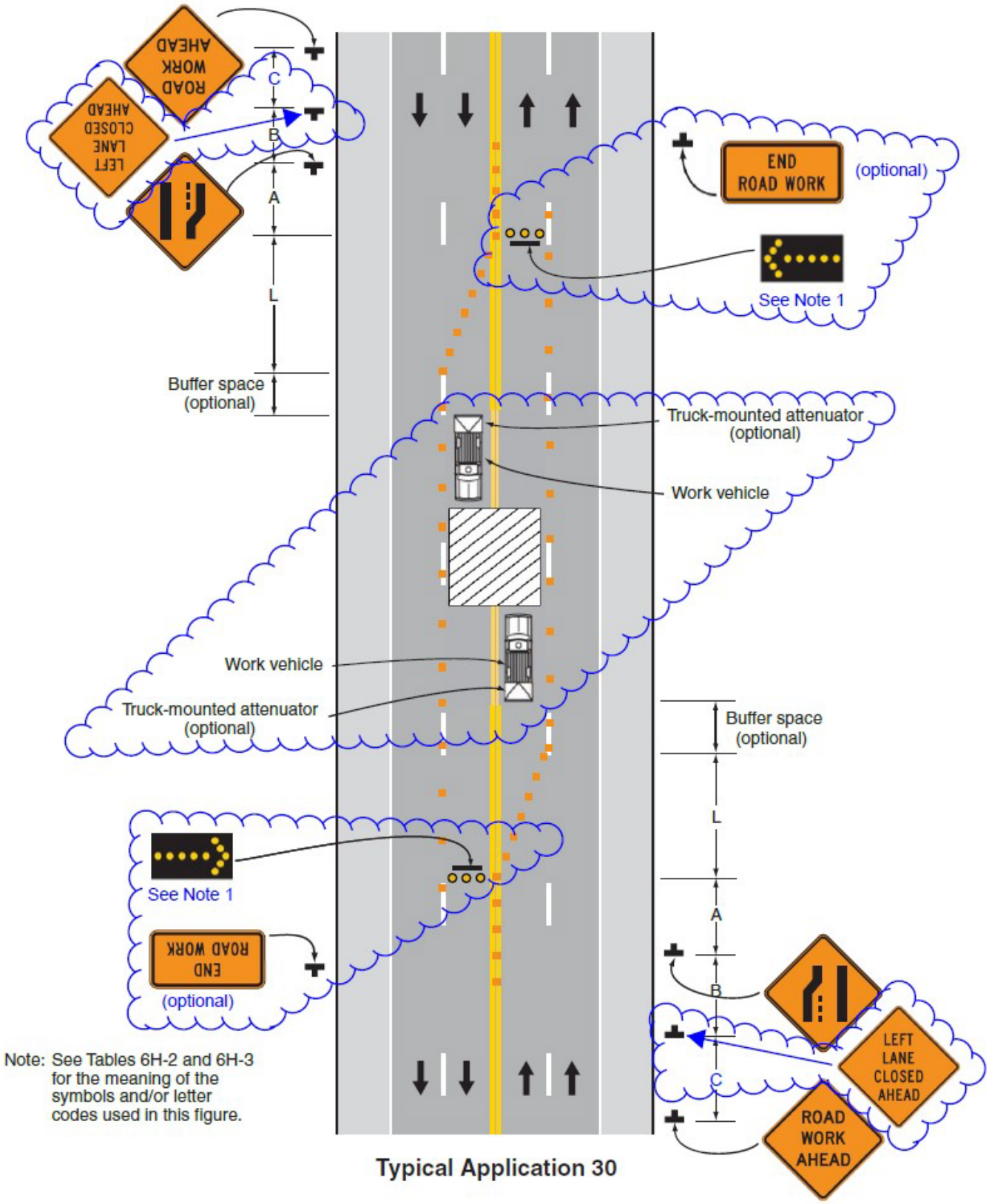
3. Arrow boards, if used, may be vehicle-mounted.

~~2.~~4. Additional positive protection devices may be used per Section 6F.84a. [approved by Council 01/10/2020]

~~3.~~5. The closure of the adjacent interior lane in the opposing direction may not be necessary, depending upon the activity being performed and the work space needed for the operation.

~~4.~~6. Shadow vehicles with a truck-mounted attenuator may be used.

Figure 6H-30. Interior Lane Closure on a Multi-Lane Street (TA-30)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 30

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Notes for Figure 6H-31 – Typical Application 31
Lane Closure on a Street with Uneven Directional Volumes

Standard:

1. The illustrated information shall be used only when the vehicular traffic volume indicates that two lanes of vehicular traffic shall be maintained in the direction of travel for which one lane is closed.

2. If an arrow board is used in the closed lane, the longitudinal distance downstream of the arrow board shall not be used as buffer space.

Option:

~~2.~~3. The procedure may be used during a peak period of vehicular traffic and then changed to provide two lanes in the other direction for the other peak.

Guidance:

~~*3. For high speeds, a LEFT LANE CLOSED XX FT sign should be added for vehicular traffic approaching the lane closure, as shown in Figure 6H-32.*~~

4. Arrow boards should be used to advise approaching traffic of a lane closure in any of the following situations: high traffic volumes, high speeds, limited sight distances, or conditions where road users are less likely to expect such lane closures (see Section 6F.61).

~~*4.*~~*5. Conflicting pavement markings should be removed for long-term projects. For short-term and intermediate-term projects where this is not practical, the channelizing devices in the area where the pavement markings conflict should be placed at a maximum spacing of 1/2 S feet where S is the speed in mph. Temporary markings should be installed where needed.*

~~*5.*~~*6. If the lane shift has curves with recommended speeds of 30 mph or less, Reverse Turn signs should be used.*

~~*6.*~~*7. Where the shifted section is long, a Reverse Curve sign should be used to show the initial shift and a second sign should be used to show the return to the normal alignment.*

~~*7.*~~*8. If the tangent distance along the temporary diversion is less than 600 feet, the Double Reverse Curve sign should be used at the location of the first Two Lane Reverse Curve sign. The second Two Lane Reverse Curve sign should be omitted.*

Standard:

~~8.~~9. The number of lanes ~~illustrated~~ on the Reverse Curve or Double Reverse Curve signs shall be the same as the number of through lanes available to road users, and the direction of the reverse curves shall be appropriately illustrated.

Option:

10. Arrow boards, if used, may be vehicle-mounted.

~~9.~~11. Positive protection devices may be used per Section 6F.84a. [approved by Council 01/10/2020]

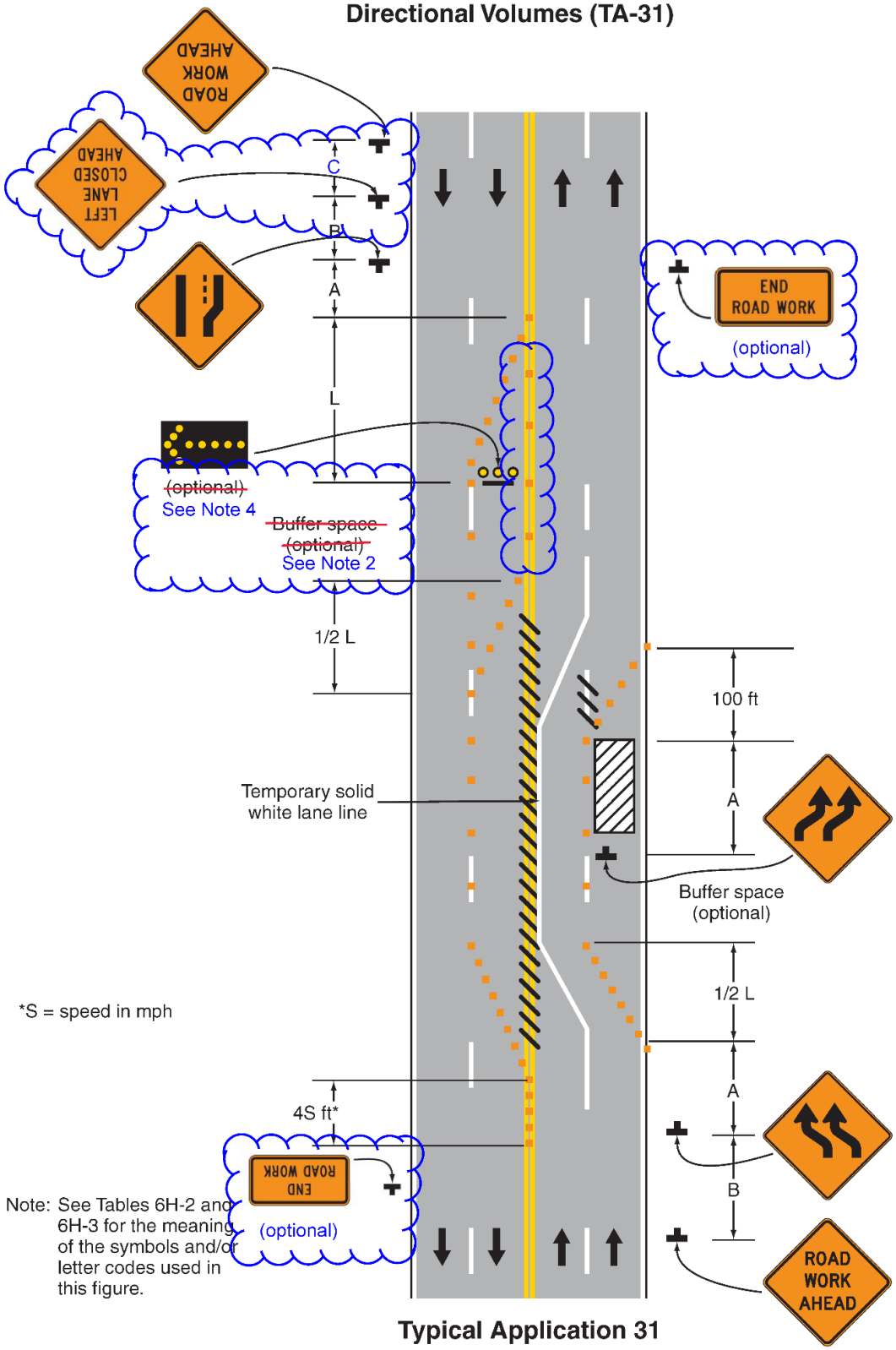
~~10.~~12. A longitudinal buffer space may be used in the activity area to separate opposing vehicular traffic.

~~11.~~13. Where two or more lanes are being shifted, a W1-4 (or W1-3) sign with an ALL LANES (W24-1cP) plaque (see Figure 6F-4) may be used instead of a sign that illustrates the number of lanes.

~~12.~~14. Where more than three lanes are being shifted, the Reverse Curve (or Turn) sign may be rectangular.

~~13.~~15. A work vehicle or a shadow vehicle may be equipped with a truck mounted attenuator.

Figure 6H-31. Lane Closures on a Street with Uneven Directional Volumes (TA-31)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 31

Notes for Figure 6H-35 – Typical Application 35
Mobile Operation on a Multi-Lane Road

Standard:

1. **Arrow boards shall, as a minimum, be Type B, with a size of 60 x 30 inches.**
2. **Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.**
3. **Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights.**
4. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**

Guidance:

5. *Vehicles used for these operations should be made highly visible with appropriate equipment, such as flags, signs, or arrow boards.*
6. *Shadow Vehicle 1 should be equipped with an arrow board and truck-mounted attenuator.*
7. *Shadow Vehicle 2 should be equipped with an arrow board. An appropriate lane closure sign should be placed on Shadow Vehicle 2 so as not to obscure the arrow board.*
8. *Shadow Vehicle 2 should travel at a varying distance from the work operation so as to provide ~~adequate~~ stopping sight distance for vehicular traffic approaching from the rear.*
9. *The spacing between the work vehicles and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between.*
10. *Work should normally be accomplished during off-peak hours.*
11. *When the work vehicle occupies an interior lane (a lane other than the far right or far left) of a directional roadway having a right-hand shoulder 10 feet or more in width, Shadow Vehicle 2 should drive the right-hand shoulder with a sign indicating that work is taking place in the interior lane.*

Option:

12. A truck-mounted attenuator may be used on Shadow Vehicle 2.

12a. Additional positive protection devices may be used per Section 6F.84a. [approved by Council 01/10/2020]

13. On high-speed roadways, a third shadow vehicle (not shown) may be used with Shadow Vehicle 1 in the closed lane, Shadow Vehicle 2 straddling the edge line, and Shadow Vehicle 3 on the shoulder.
14. Where adequate shoulder width is not available, Shadow Vehicle 3 may also straddle the edge line.

Notes for Figure 6H-40 – Typical Application 40
Median Crossover for an Entrance Ramp

Guidance:

1. *The typical application illustrated should be used for carrying an entrance ramp across a closed directional roadway of a divided highway.*

Standard:

2. Where inadequate acceleration distance exists for the temporary entrance, a STOP sign shall be installed. [approved by Council 01/05/2018]

Guidance:

~~2.~~*3.* *A temporary acceleration lane should be used to facilitate merging.*

~~3.~~*4.* *When used, the YIELD or STOP sign should be located far enough forward to provide ~~adequate~~ stopping sight distance of oncoming mainline vehicular traffic to select an acceptable gap, but should not be located so far forward that motorists will be encouraged to stop in the path of the mainline traffic. If needed, yield or stop lines should be installed across the ramp to indicate the point at which road users should yield or stop. Also, a longer acceleration lane should be provided beyond the sign to reduce the gap size needed.*

5. If sufficient gaps are not available, consideration should be given to closing the ramp. [approved by Council 01/05/2018]

Option:

6. Positive protection devices may be used per Section 6F.84a. [approved by Council 01/10/2020]

~~4.~~7. If vehicular traffic conditions allow, the ramp may be closed.

~~5.~~8. A broken edge line may be carried across the temporary entrance ramp to assist in defining the through vehicular traffic lane.

~~6.~~9. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic signs and the DO NOT ENTER signs may be eliminated.

~~7.~~10. A Stop Beacon (see Section 4L.05) or a Type B high-intensity warning flasher with a red lens may be placed above the STOP sign.

~~8.~~11. Where the acceleration distance is significantly reduced, a supplemental plaque may be placed below the Yield Ahead sign reading NO MERGE AREA. [approved by Council 01/05/2018]

Notes for Figure 6H-44 – Typical Application 44
Work in the Vicinity of an Entrance Ramp

Guidance:

1. *An acceleration lane of sufficient length should be provided whenever possible as shown on the left diagram.*

Standard:

2. **For the information shown on the diagram on the right-hand side of the typical application, where inadequate acceleration distance exists for the temporary entrance, a STOP sign shall be installed. ~~the YIELD sign shall be replaced with STOP signs (one on each side of the approach).~~** [approved by Council 01/05/2018]

Guidance:

3. *When used, the YIELD or STOP sign should be located so that ramp vehicular traffic has ~~adequate~~ stopping sight distance of oncoming mainline vehicular traffic to select an acceptable gap in the mainline vehicular traffic flow, but should not be located so far forward that motorists will be encouraged to stop in the path of the mainline traffic. Also, a longer acceleration lane should be provided beyond the sign to reduce the gap size needed. If sufficient ~~insufficient~~ gaps are not available, consideration should be given to closing the ramp.* [approved by Council 01/05/2018]
4. *Where a STOP sign is ~~signs are~~ used, a temporary stop line should be placed across the ramp at the desired stop location.* [approved by Council 01/05/2018]
5. *The mainline merging taper with the arrow board at its starting point should be located sufficiently in advance so that the arrow board is not confusing to drivers on the entrance ramp, and so that the mainline merging vehicular traffic from the lane closure has the opportunity to stabilize before encountering the vehicular traffic merging from the ramp.*
6. *If the ramp curves sharply to the right, warning signs with advisory speeds located in advance of the entrance terminal should be placed in pairs (one on each side of the ramp).*

Option:

7. Positive protection devices may be used per Section 6F.84a. [approved by Council 01/10/2020]

~~7.~~8. A Stop Beacon (see Section 4L.05) or a Type B high-intensity warning flasher with a red lens may be placed above the STOP sign.

~~8.~~9. Where the acceleration distance is significantly reduced, a supplemental plaque may be placed below the Yield Ahead sign reading NO MERGE AREA.

Standard:

~~9.~~10. **An arrow board shall be used when a freeway lane is closed. When more than one freeway lane is closed, a separate arrow board shall be used for each closed lane.**