



**Minnesota Manual  
on  
Uniform Traffic  
Control Devices**

*MN*

*MUTCD*

**January 2014**



**MINNESOTA  
MANUAL  
ON  
UNIFORM  
TRAFFIC  
CONTROL  
DEVICES**



**MN  
MUTCD**

**January 2014**





## Minnesota Department of Transportation

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### Office of Traffic, Safety, and Technology

Mail Stop 725  
1500 West County Road B2  
Roseville, MN 55113

December 30, 2013

Phone (651)234-7000

TO: Holders of the 2011 Minnesota Manual on Uniform Traffic Control Devices (2011 MN MUTCD)

Transmitted herewith is Revision Number 3 (dated January, 2014) to the "2011 Minnesota Manual on Uniform Traffic Control Devices" (2011 MN MUTCD) as adopted by the Commissioner of the Minnesota Department of Transportation (MnDOT). The attached pages to the 2011 MN MUTCD incorporate changes or corrections brought about by changes in the FHWA MUTCD and Minnesota practices or procedures.

All revised pages are attached herewith and shall replace corresponding pages in this manual. The attached Commissioner's Order No. 94040 amends Commissioner's Orders 93799, 93167 and 92452. It is important to retain all Orders because they amend but do not replace previous Orders.

The 2011 MN MUTCD including Revision Numbers 1, 2, and 3 is available on the MnDOT website at <http://www.dot.state.mn.us/trafficeng/publ/mutcd/index.html>. This manual will be updated annually, typically near the beginning of each calendar year. The latest version will be available on the website after it has been adopted by the Commissioner of Transportation.

MnDOT no longer maintains a mailing list for printed updates to this manual. Users of the the manual must fill out the "Updates Notification Form" found on the website above under "Quick Links." When an update/revision is made to the manual, an email will be sent out advising users to visit the website. The user must then download and print the revised pages and insert them into the printed version of their 2011 MN MUTCD.

To purchase additional copies of this manual or other State of Minnesota manuals call the MnDOT Map & Manual Sales Unit at 651-366-3017 for current costs and ordering information. They are located at the following address:

MnDOT Map & Manual Sales Unit  
395 John Ireland Blvd. - MS 260  
St. Paul, Minnesota 55155-1899

Comments regarding the content of the 2011 MN MUTCD should be referred to Janelle Anderson, MnDOT, Office of Traffic, Safety and Technology, phone (651) 234-7388, email address: [janelle.anderson@state.mn.us](mailto:janelle.anderson@state.mn.us).

Sincerely,

A handwritten signature in black ink that reads "Susan M. Groth".

Susan M. Groth, PE, PTOE  
State Traffic Engineer



**REVISIONS TO THE  
2011 MINNESOTA UNIFORM TRAFFIC CONTROL DEVICES MANUAL  
ORDER NO. 94040**

This is the third order revising the 2011 Minnesota Manual on Uniform Traffic Control Devices (2011 MN MUTCD).

By Order number 92452 dated December 15, 2011 and published in the State Register of December 26, 2011, the Commissioner of Transportation (Commissioner) has adopted the 2011 MN MUTCD establishing a uniform system of traffic control devices for streets and highways of the State of Minnesota as required by Minnesota Statutes, Section 169.06, Subdivision 1 (2011). The 2011 MN MUTCD correlates with and so far as possible conforms to the current system as approved by the American Association of State Highway Officials and the national Manual on Uniform Traffic Control Devices (Federal MUTCD). (Minn. Stat. § 169.06, subd. 1 (2011); Federal Highway Administration, 23 C.F.R. § 655.603 (2011).)

The Commissioner adopted revisions and changes to the 2011 MN MUTCD by Order numbers:

93167 dated July 12, 2012 published in the State Register of July 23, 2012, and  
93799 dated July 8, 2013 published in the State Register of August 5, 2013.

A multi-agency committee has reviewed the changes in the 2009 Federal MUTCD and recommended further revisions and additions.

Pursuant to Minnesota Statutes, Section 169.06, subd. 1 (2011), and 169.215, subd. 2 (2011), the Commissioner hereby adopts the revisions listed below:

Record of Revisions or Additions to the MN MUTCD

Revision Number	Date Issued	Pages Revised or Added
3	12/11/2013	v, ix, 2B-i, 2B-17, 2B-55, 2C-ii, 2C-23, 2C-26 thru 2C-36, 2D-28, 2E-11, 3B-14, 3C-1, 4G-3, 4L-1, 6A-iii thru 6A-vi, 6F-3 thru 6F-5, 6F-14, 6F-17, 6F-19, 6F-20, 6F-40 thru 6F-53, 6G-7, 6J-iii, 6J-2, 6J-4, 6J-5, 6J-7, 6J-8, 6J-10, 6J-11, 6J-14 thru 6J-21, 6J-24a thru 6J-25b, Chapter 6K ( <i>the Field Manual</i> ) in its entirety, 7B-2, 8B-2, 9B-6, C-3, C-19, C-38, C-39, C-46, C-56 thru C-58, remove Appendix B in its entirety.

This Order revises Commissioner's Order number 92452, dated December 15, 2011 as revised by Commissioner's Orders numbers 93167 dated July 12, 2012 and 93799 dated July 8, 2013.

Signed this 11th day of December 2013.

A handwritten signature in blue ink, appearing to read "Charlie Zelle". The signature is stylized and cursive.

Charlie Zelle  
Commissioner of Transportation

Year	Name	Commissioner's Order Number	Month/Day/Year of Adoption
1939	Manual on Uniform Traffic Control Devices for Streets and Highways of the State of Minnesota	12328	4/21/39
1949	Manual on Uniform Traffic Control Devices for Streets and Highways of the State of Minnesota	19270	3/22/49
1956	Manual on Uniform Traffic Control Devices for Streets and Highways of the State of Minnesota	25729	5/23/56
1962	Manual on Uniform Traffic Control Devices for Streets and Highways of the State of Minnesota	32517 49894 50987	2/16/62 9/15/71 4/21/72
1974	Minnesota Manual on Uniform Traffic Control Devices for Streets and Highways	54014	12/20/73
1986	Minnesota Manual on Uniform Traffic Control Devices for Streets and Highways (MN MUTCD)	70797 71787	4/15/86, 12/19/86
1991	Minnesota Manual on Uniform Traffic Control Devices for Streets and Highways (MN MUTCD)	77588 78988 79901 80748 80878 81551 82232 82843 83387 84240 85045	10/3/91 1/4/93 2/4/94 1/6/95 4/3/95 3/15/96 1/10/97 1/2/98 11/17/99 1/26/00 12/20/00
2001	Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD)	86252 87127 87570	4/15/02 5/22/03 1/2/04
2005	Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD)	88522 89453 90038 90627	5/5/05 1/2/07 2/15/08 3/26/09
2011	Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD)	92952 93167 93799 94040	12/15/11 7/15/12 7/29/13 12/11/13

Table I-1a. Evolution of the Minnesota MUTCD

MN Rev. 1  
MN Rev. 2  
MN Rev. 3

**GUIDANCE:**

The States should adopt Section 15-116 of the UVC, which states that "No person shall install or maintain in any area of private property used by the public any sign, signal, marking, or other device intended to regulate, warn, or guide traffic unless it conforms with the State manual and specifications adopted under Section 15-104."

**SUPPORT:**

The Standard, Guidance, Option, and Support material described in this edition of the MUTCD provide the transportation professional with the information needed to make appropriate decisions regarding the use of traffic control devices on streets, highways, bikeways, and private roads open to public travel (see definition in Section 1A.13).

Throughout this Manual the headings Standard, Guidance, Option, and Support are used to classify the nature of the text that follows. Figures and tables, including the notes contained therein, supplement the text and might constitute a Standard, Guidance, Option, or Support. The user needs to refer to the appropriate text to classify the nature of the figure, table, or note contained therein.

**STANDARD:**

When used in this Manual, the text headings of Standard, Guidance, Option, and Support shall be as defined in the first paragraph of Section 1A.13.

**SUPPORT:**

Throughout this Manual all dimensions and distances are provided in English units. Appendix A2 contains tables for converting each of the English unit numerical values that are used in this Manual to the equivalent Metric (International System of Units) values.

**GUIDANCE:**

If Metric units are to be used in laying out distances or determining sizes of devices, such units should be specified on plan drawings and made known to those responsible for designing, installing, or maintaining traffic control devices.

Except when a specific numeral is required or recommended by the text of a Section of the Manual, numerals displayed on the images of devices in the figures that specify quantities such as times, distances, speed limits, and weights should be regarded as examples only. When installing any of these devices, the numerals should be appropriately altered to fit the specific situation.

**SUPPORT:**

The following information will be useful when reference is being made to a specific portion of text in this Manual.

There are nine Parts in this Manual and each Part is

comprised of one or more Chapters. Each Chapter is comprised of one or more Sections. Parts are given a numerical identification, such as Part 2-Signs. Chapters are identified by the Part number and a letter, such as Chapter 2B-Regulatory Signs, Barricades and Gates. Sections are identified by the Chapter number and letter followed by a decimal point and a number, such as Section 2B.3-Size of Regulatory Signs.

Each Section is comprised of one or more paragraphs. The paragraphs are indented but are not identified by a number. Paragraphs are counted from the beginning of each Section without regard to the intervening text headings (Standard, Guidance, Option, or Support). Some paragraphs have lettered or numbered items. As an example of how to cite this Manual, the phrase "Not less than 40 feet beyond the stop line" that appears in Section 4D-14 of this Manual would be referenced in writing as "Section 4D.14, P7, D1, A.1," and would be verbally referenced as "Item A.1 of Paragraph 1 of Section 4D.14."

**STANDARD:**

In accordance with 23 CFR 655.603(b)(3), Minnesota shall revise the MN MUTCD to be in substantial conformance with changes to the National MUTCD within 2 years of the effective date of the Final Rule for the changes. Substantial conformance of such State or other Federal agency MUTCDs or Supplements shall be as defined in 23 CFR 655.603(b)(1).

After the adoption and issuance of a new edition of the MN MUTCD or a revision thereto, new or reconstructed devices installed shall be in compliance with the new edition or revision.

In cases involving Federal-aid projects for new street, highway or bicycle trail construction or reconstruction, the traffic control devices installed (temporary or permanent) shall be in conformance with the most recent edition of the MN MUTCD before that highway is opened or re-opened to the public for unrestricted travel [23 CFR 655.603(d)(2) and (d)(3)].

Unless a particular device is no longer serviceable, non-compliant devices on existing highways and bikeways shall be brought into compliance with the current edition of the MN MUTCD as part of the systematic upgrading of substandard traffic control devices (and installation of new required traffic control devices) required pursuant to the Highway Safety Program, 23 U.S.C. § 402(a). The FHWA and the State of Minnesota have the authority to establish other target compliance dates for implementation of particular changes to the MN MUTCD [23 CFR 655.603(d)(1)]. These target compliance dates established by the FHWA shall be as shown in Table I-2.

Except as provided in the following Option, when a non-compliant traffic control device is being replaced or refurbished because it is damaged, missing, or no longer serviceable for any reason, it shall be replaced with a compliant device.

In addition, the section, portion of a section or graphic which shall be in compliance for future dates shall be encased in a red box or continuation of a red box together with the compliance date which is also in red. That section, portion of a section, or graphic which shall have already been in compliance for past dates shall be encased in a red dashed box or continuation of a red box together with the compliance date which is also in red.

This user of this Manual is encouraged to refer to Table I-2 for further information.

**OPTION:**

A damaged, missing, or otherwise non-serviceable device that is non-compliant may be replaced in kind if engineering judgment indicates that:

- A. One compliant device in the midst of a series of adjacent non-compliant devices would be confusing to road users; and/or
- B. The schedule for replacement of the whole series of non-compliant devices will result in achieving timely compliance with the MN MUTCD.

## Approved Revisions

This loose-leafed edition of the MN MUTCD incorporates all revisions which have been approved by the Federal Highway Administrator. This 2011 Edition of the MN MUTCD includes all official final rulings, interpretations, and modifications as of December 15, 2011.

A list of all official changes/revisions to this manual can be found in the Record of Revisions starting on page ix. As changes/revisions are made to each page, the revision number and date of revision will be added and so marked in the outside margin adjacent to the appropriate text or figure. The date at the bottom outside corner of each page indicates the date the official text revisions were distributed.

## Symbols and Additions

This edition of the MN MUTCD continues the national trend set in the Federal MUTCD toward a broader use of symbols as alternatives to word messages. Also, the following new parts have been added to the MN MUTCD:

Appendix A1, Congressional Legislation

Appendix A2, Metric Conversions

Appendix A3, Retroreflective Sheeting  
Identification Guide

Appendix C, Sign Listing

||  
MN Rev. 1  
MN Rev. 3

2011 MN MUTCD Section Number(s)	2011 MN MUTCD Section Title	Section	Compliance Date
2A.8	Maintaining Minimum Retroreflectivity	Implementation and continued use of an assessment or management method that is designed to maintain regulatory and warning sign retroreflectivity at or above the established minimum levels (see 1st Standard, 2nd paragraph)	June 13, 2014 *
2A.19	Lateral Offset	Crashworthiness of sign supports on roads with posted speed limit of 50 mph or higher (see 1st Standard, 2nd paragraph)	January 17, 2013 (date established in the 2000 FHWA MUTCD)
2B.40	ONE WAY Signs (R6-1 , R6-2)	New requirements in the 2009 FHWA MUTCD for the number and locations of ONE WAY signs (see 1st Standard, 4th paragraph; 2nd Standard, 3rd and 4th paragraphs)	December 31, 2019
2C.6 through 2C.14	Horizontal Alignment Warning Signs	Revised requirements in the 2009 FHWA MUTCD regarding the use of various horizontal alignment signs (see Table 2C-5)	December 31, 2019
2E.31, 2E.33, and 2E.36	Plaques for Left-Hand Exits	New requirement in the 2009 FHWA MUTCD to use E1-5aP and E1-5bP plaques for left-hand exits	December 31, 2014
4D.26	Yellow Change and Red Clearance Intervals	New requirement in the 2009 FHWA MUTCD that durations of yellow change and red clearance intervals shall be determined using engineering practices (see 1st Standard, 3rd paragraph; 2nd Standard)	June 13, 2017, or when timing adjustments are made to the individual intersection and/or corridor whichever comes first
4E.6	Pedestrian Intervals and Signal Phases	New requirement in the 2009 FHWA MUTCD that the pedestrian change interval shall not extend into the red clearance interval and shall be followed by a buffer interval of at least 3 seconds (1st Standard, 4th paragraph)	June 13, 2017, or when timing adjustments are made to the individual intersection and/or corridor whichever comes first
6D.3 **	Worker Safety Considerations	New requirement in the 2009 FHWA MUTCD that all workers within the right-of-way shall wear high-visibility apparel (1st Standard; 2nd Standard, 1st and 2nd paragraphs)	December 31, 2011
6E.2 **	High-Visibility Safety Apparel	New requirement in the 2009 FHWA MUTCD that all flaggers within the right-of-way shall wear high-visibility apparel	December 31, 2011
7D.4 **	Uniform of Adult Crossing Guards	New requirement in the 2009 FHWA MUTCD for high-visibility apparel for adult crossing guards	December 31, 2011
8B.4, 8B.4	Grade Crossing (Crossbuck) Signs and Supports	Retroreflective strip on Crossbuck sign and support (see Section 8B.3, 3rd Standard, 3rd paragraph and Section 8B.4, 3rd Standard and 4th Standard, 1st paragraph)	December 31, 2019
8B.4	Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings	New requirement in the 2009 FHWA MUTCD for the use of STOP or YIELD signs with Crossbuck signs at passive grade crossings	December 31, 2019

\* Types of signs other than regulatory or warning are to be added to an agency's management or assessment method as resources allow.

\*\* FHWA MUTCD requirement is a result of a legislative mandate,

Note: All compliance dates that were previously published in Table I-2 of the 2009 FHWA MUTCD and 2011 MN MUTCD and that do not appear in this revised table have been eliminated.

**Table I-2. Target Compliance Dates Established by the FHWA**

## RECORD OF REVISIONS OR ADDITIONS

Revision Number	Date Issued	Pages Revised or Added
	12/15/2011	Issued as a new manual
1	6/15/2012	v, viii, ix, 1A-4, 1A-28, 1A-29, 2A-5, 2A-18, 2B-1 thru 2B-6, 2B-11, 2B-15, 2B-34, 2B-35, 2B-38, 2B-41, 2B-53, 2B-56, 2B-57, 2C-3, 2C-4, 2C-11, 2C-13, 2C-17, 2C-18, 2C-20, 2C-24 thru 2C-28, 2C-30, 2C-34, 2D-23, 2D-27 thru 2D-29, 2E-6, 2E-33, 2E-37, 2E-41, 2E-51, 2F-6, 2G-11, 2G-16, 2I-2, 2I-5, 2I-10, 2I-11, 2I-13, 2J-5, 2M-1, 2M-2, 2N-2, 3B-27, 3B-35, 4D-1, 4D-39, 4D-46, 4E-3, 4E-6, 4F-3, 5C-2, 6D-1, 6D-2, 6D-4, 6E-1, 6F-3, 6F-7, 6F-20, 6F-29, 6F-37, 6F-52, 6G-1, 7B-1, 7B-5, 7B-6, 7B-9, 7B-11, 7C-1, 7D-1, 7E-a thru 7E-21, 8B-1, 8B-3, 8B-4, 8B-7 thru 8B-10, 8B-14, 8B-18, 8C-4, 8C-8, 8C-9, 9A-i, 9A-ii, 9B-2 thru 9B4, 9B-6, 9B-9, 9B-18, 9C-1, A2-1, C-1 thru C-8, C-15 thru C-24, C-26, C-28 thru C-31, C-33 thru C-40, C-42, C-43, C-47, C-52 thru C-60, C-62 thru C-70, C-75 thru C-77, C-79 thru C-83
2	6/29/2013	ii, vi, 2A-4, 2A-18, 2A-19, 2B-2 thru 2B-6, 2B-11, 2B-12, 2B-18, 2B-21, 2B-22, 2B-37, 2B-40, 2B-47, 2B-48, 2B-51, 2B-56, 2B-59, 2C-4, 2C-5, 2C-7, 2C-10, 2C-26, 2C-32, 2D-1, 2D-9, 2D-27, 2D-39, 2E-18, 2E-47, 2E-48, 2E-51, 2G-3, 2G-4, 2H-i, 2H-2, 2H-7 thru 2H-9, 2I-2 thru 2I-4, 2I-7, 2I-10, 2J-4, 2J-6, 2K-1, 2K-5, 2M-i, 2M-1, 2M-2, 2M-9, 2M-12 thru 2M-14, 3B-9, 4D-2, 4D-31, 4D-33, 6F-5, 6J-4, 6J-17, 7A-i, 7B-2, 7B-10, 9B-9, 9B-16, 9B-18, C-1, C-2, C-5, C-13, C-14, C-16 thru C-21, C-24, C-26 thru C-39, C-41 thru C-57, C-59 thru C-61, C-63 thru C-66, C-82 thru C-95, INDEX-9 thru INDEX-16.
3	12/11/2013	v, ix, 2B-i, 2B-17, 2B-55, 2C-ii, 2C-23, 2C-26 thru 2C-36, 2D-28, 2E-11, 3B-14, 3C-1, 4G-3, 4L-1, 6A-iii thru 6A-vi, 6F-3 thru 6F-5, 6F-14, 6F-17, 6F-19, 6F-20, 6F-40 thru 6F-53, 6G-7, 6J-iii, 6J-2, 6J-4, 6J-5, 6J-7, 6J-8, 6J-10, 6J-11, 6J-14 thru 6J-21, 6J-24a thru 6J-25b, Chapter 6K ( <i>the Field Manual</i> ) in its entirety, 7B-2, 8B-2, 9B-6, C-3, C-19, C-38, C-39, C-46, C-56 thru C-58, remove Appendix B in its entirety.



# Chapter 2B. REGULATORY SIGNS

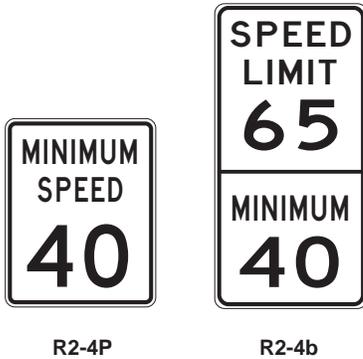
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**2B.16 Minimum Speed Limit Sign (R2-4P)**

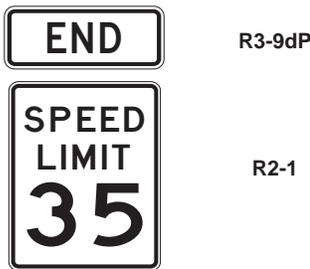


**STANDARD:**

A Minimum Speed Limit (R2-4P) plaque shall be displayed only in combination with a Speed Limit sign.

**OPTION:**

Where engineering judgment determines that slow speeds on a highway might impede the normal and reasonable movement of traffic, the Minimum Speed Limit plaque may be installed below a Speed Limit (R2-1) sign to indicate the minimum legal speed. If desired, the Speed Limit sign and the Minimum Speed Limit plaque may be combined on the R2-4b sign.



**SUPPORT:**

There are many secondary roads (county, township and municipal) which have had speed zones established. These zones are in and on the fringes of urban districts (as defined in Minnesota Statute, section 169.011) where the rural speed limit remains at that provided in the statutes and continuous speed zoning has not been warranted. In many instances, the posting of the statutory speed limit in order to terminate the reduced speed zone would be inappropriate because the statutory speed limit would be misleading and encourage drivers to travel too fast for conditions. Sound engineering judgement would dictate that no numerical value should be posted and that the basic rule ( Minnesota Statute, section 169.14, subd. 1) should apply.

**OPTION:**

In order to provide for the termination of the reduced speed zone, either a Speed Limit (R2-1) sign with the ending speed limit and an END (R3-9dP) or a Speed Limit (R2-1) sign with the new speed limit may be used.

**2B.16.2 END WORK SPEED ZONE Sign (R2-6c)**



**SUPPORT:**

Certain street and highway construction and maintenance operations may justify the erection of regulatory signs with a recommended speed as determined by the appropriate road authority. It is necessary to install a regulatory sign to inform the motorists of the end of the regulatory speed zone.

**STANDARD:**

The sign shall be installed on its own structure at the end of the zone in accordance with standard signing practices for construction zone signs.

**2B.17 Higher Fines Signs and Plaque (R2-6P, R2-10, and R2-11)**



**STANDARD:**

If increased fines are imposed for traffic violations within a designated zone of a roadway, a BEGIN HIGHER FINES ZONE (R2-10) sign or a FINES HIGHER (R2-6P) plaque shall be used to provide notice to road users. If used, the FINES HIGHER plaque shall be mounted below an applicable regulatory or warning sign in a temporary traffic control zone, a school zone, or other applicable designated zone.

If an R2-10 sign or an R2-6P plaque is posted to provide notice of increased fines for traffic violations, an END HIGHER FINES ZONE (R2-11) sign shall be installed at the downstream end of the zone to provide notice to road users of the termination of the increased fines zone.

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**GUIDANCE:**

If used, the BEGIN HIGHER FINES ZONE sign or FINES HIGHER plaque should be located at the beginning of the temporary traffic control zone, school zone, or other applicable designated zone and just beyond any interchanges, major intersections, or other major traffic generators.

**STANDARD:**

The Higher Fines signs and plaque shall have a black legend and border on a white rectangular background. All supplemental plaques mounted below the Higher Fines signs and plaque shall have a black legend and border on a white rectangular background.

**GUIDANCE:**

Agencies should limit the use of the Higher Fines signs and plaque to locations where work is actually underway, or to locations where the roadway, shoulder, or other conditions, including the presence of a school zone and/or a reduced school speed limit zone, require a speed reduction or extra caution on the part of the road user.

**OPTION:**

Alternate legends such as BEGIN (or END) DOUBLE FINES ZONE may also be used for the R2-10 and R2-11 signs.

The legend FINES HIGHER on the R2-6P plaque may be replaced by FINES DOUBLE (R2-6aP), \$XX FINE (R2-6bP), or another legend appropriate to the specific regulation.

The following may be mounted below an R2-10 sign or R2-6P plaque:

- A. A supplemental plaque specifying the times that the higher fines are in effect (similar to the S4-1P plaque), or
- B. A supplemental plaque WHEN CHILDREN (WORKERS) ARE PRESENT, or
- C. A supplemental plaque WHEN FLASHING (similar to the S4-4P plaque) if used in conjunction with a yellow flashing beacon.

**SUPPORT:**

Section 6F.12 contains information regarding other signs and plaques associated with increased fines for traffic violations in temporary traffic control zones. Section 7B.10 contains information regarding other signs and plaques associated with increased fines for traffic violations in designated school zones.

## 2B.18 Movement Prohibition Signs (R3-1 through R3-4, R3-18 and R3-27)



R3-1



R3-2



R3-3



R3-4



R3-18



R3-27

**STANDARD:**

Except as provided in the following second Option, where specific movements are prohibited, Movement Prohibition signs shall be installed.

**GUIDANCE:**

Movement Prohibition signs should be placed where they will be most easily seen by road users who might be intending to turn.

If No Right Turn (R3-1) signs are used, at least one should be placed either over the roadway or at a right-hand corner of the intersection.

If No Left Turn (R3-2) signs are used, at least one should be placed over the roadway, at the far left-hand corner of the intersection, on a median, or in conjunction with the STOP sign or YIELD sign located on the near right-hand corner.

Except as provided in Item C In the Guidance below, for signalized locations, if NO TURNS (R3-3) signs are used, two signs should be used, one at a location specified for a No Right Turn sign and one at a location specified for a No Left Turn sign.

If No U-Turn (R3-4) signs or combination No U-Turn/No Left Turn (R3-18) signs are used, at least one should be used at a location specified for No Left Turn signs.

**OPTION:**

If both left turns and U-turns are prohibited, the combination No U-Turn/No Left Turn (R3-18) sign may be used instead of separate R3-2 and R3-4 signs.

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## 2B.58.2 Sidewalk Closed Signs (R9-9, R9-10)

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R9-9



R9-10

### **GUIDANCE:**

The Sidewalk Closed signs should be used where pedestrian flow is restricted or rerouted due to road work. The SIDEWALK CLOSED sign (R9-9) should be installed at the beginning of the closed sidewalk section and elsewhere along the closed section as needed. The SIDEWALK CLOSED USE OTHER SIDE sign (R9-10) should be installed at the beginning of the restricted sidewalk section when a parallel sidewalk exists on the other side of the roadway.

These signs are typically installed on a barricade device to act as a reminding message to encourage compliance.

## 2B.59 Weight Limit Signs (R12-1 through R12-5)



R12-1



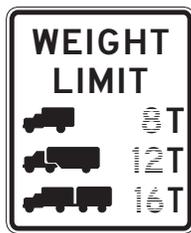
R12-2



R12-4



R12-3



R12-5

### **OPTION:**

The Weight Limit (R12-1) sign carrying the legend WEIGHT LIMIT XX TONS may be used to indicate vehicle weight restrictions including load.

Where the restriction applies to axle weight rather than gross load, the legend may be AXLE WEIGHT LIMIT XX TONS or AXLE WEIGHT LIMIT XXXX LBS (R12-2).

To restrict trucks of certain sizes by reference to empty weight in residential areas, the legend may be NO TRUCKS OVER XX TONS EMPTY WT or NO TRUCKS OVER XX LBS EMPTY WT (R12-3).

In areas where multiple regulations of the type described in the three previous paragraphs are applicable, a sign combining the necessary messages on a single sign may be used, such as WEIGHT LIMIT XX TONS PER AXLE, XX TONS GROSS (R12-4).

Posting of specific load limits may be accomplished by use of the Weight Limit symbol sign (R12-5). A sign containing the legend WEIGHT LIMIT on the top two lines, and showing three different truck symbols and their respective weight limits for which restrictions apply may be used, with the weight limits displayed to the right of each symbol as XX T. A bottom line of legend stating GROSS WT may be included if needed for enforcement purposes.

### **STANDARD:**

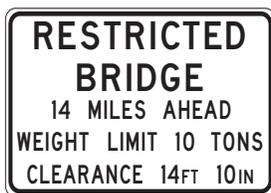
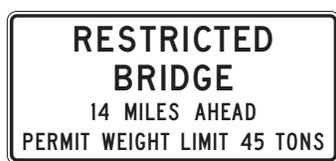
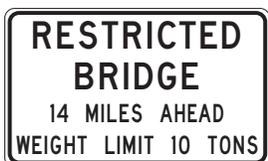
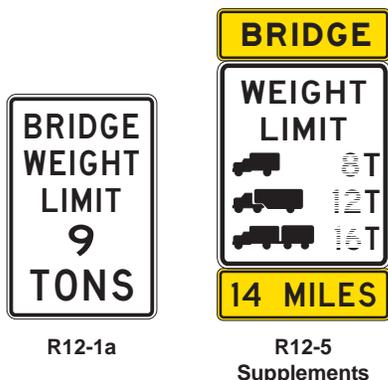
If used, the Weight Limit sign shall be located in advance of the applicable section of highway or structure.

If used, the Bridge Weight Limit sign (R12-5) shall be installed on or immediately in advance of bridges or bridge structures where it is necessary to limit the load permitted on that structure. The proper weights to display on the sign shall be based on an engineering study.

### **GUIDANCE:**

If used, the Weight Limit sign with an advisory distance ahead legend should be placed at approach road intersections or other points where prohibited vehicles can detour or turn around.

**2B.59.1 Bridge and Structure Weight, Width and Height Restriction Signs**  
**(R12-1a, R12-5 Supplement, R12.X2, R12-X4, and R12-X4A)**



**STANDARD:**

These signs shall be installed in advance of bridges or structures where it is necessary to limit the weight permitted on the bridge or structure and/or to show the clearance available on or below the bridge or structure:

1. BRIDGE WEIGHT LIMIT (x) TONS (R12-1a)
2. BRIDGE - WEIGHT LIMIT (w/symbols) - xx MILES (R12-5 Supplement)
3. RESTRICTED BRIDGE (xx) MILES AHEAD WEIGHT LIMIT (X) TONS (R12-X2)
4. RESTRICTED BRIDGE (xx) MILES AHEAD PERMIT WEIGHT LIMIT (X) TONS (R12-X2a)
5. RESTRICTED BRIDGE (xx) MILES AHEAD WEIGHT LIMIT (X) TONS - CLEARANCE (xx) FT. (XX) IN. (R12-X4)
6. RESTRICTED BRIDGE (xx) MILES AHEAD CLEARANCE (xx) FT. (xx) IN. (R12-X4a)

The weights to display on the sign shall be the same weights displayed on the Bridge Weight Limit sign (see Section 2B.59).

**GUIDANCE:**

These signs should also be placed at the nearest intersecting roadway where a motorist can detour around the restriction or at wide point in the roadway so that the motorist can turn around to avoid the restriction.

**STANDARD:**

When a bridge is restricted for specific load limits, the Weight Limit symbol sign (R12-5) shall be installed immediately in advance of the bridge.

The R12-5 Supplement combination sign consists of a BRIDGE plaque installed above and a (xx) MILES plaque installed below the Weight Limit symbol sign to present a message to the motorist that is consistent with the advance warning sign assembly.

Both plaques shall have a black legend on a yellow reflectorized background. The length of the plaques shall match that of the Weight Limit symbol sign.

When a restriction on a bridge applies to the gross load of a vehicle, the BRIDGE WEIGHT LIMIT sign (R12-1a) shall be installed immediately in advance of the bridge. If an advance warning sign is to be used, the (xx) MILES plaque of the R12-5 Supplement sign combination shall be installed below the R12-1a sign. The plaque shall have a black legend on a yellow reflectorized background and shall match the length of the R12-1a sign.



**GUIDANCE:**

The TRUCKS MUST NOT MEET ON BRIDGE sign (R12-X3) should be installed on two-way roadways in advance of bridges or structures:

1. Where the clear opening width is greater than 18 feet and less than 20 feet, the approach alignment is poor and the structure type is such that commercial vehicles cannot pass safely on the structure, or
2. Where a restriction on the meeting or passing of commercial vehicles would provide increased load capacity upon the structure.

The VEHICLES MUST NOT MEET ON BRIDGE sign (R12-X3a) should be installed on two-way roadways in advance of one-lane bridges or structures where the clear opening width is less than 16 feet. The WEIGHT RESTRICTION AHEAD sign (W14-X3) should be installed in advance of the bridge weight limit signs.

## PART 2. SIGNS

### Chapter 2C. Warning Signs and Object Markers

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## 2C.36 Advance Traffic Control Signs (W3-1, W3-2, W3-3, W3-4, W3-X2, W3-X4)



### STANDARD:

The Advance Traffic Control signs include the Stop Ahead (W3-1), Yield Ahead (W3-2), and Signal Ahead (W3-3) signs. These signs shall be installed on an approach to a primary traffic control device that is not visible for a sufficient distance to permit the road user to respond to the device (see Table 2C-4). The visibility criteria for a traffic control signal shall be based on having a continuous view of at least two signal faces for the distance specified in Table 4D-2.

### SUPPORT:

Figure 2A-4 shows the typical placement of an Advance Traffic Control sign.

Permanent obstructions causing the limited visibility might include roadway alignment or structures. Intermittent obstructions might include foliage or parked vehicles.

### GUIDANCE:

Where intermittent obstructions occur, engineering judgment should determine the treatment to be implemented.

### OPTION:

An Advance Traffic Control sign may be used for additional emphasis of the primary traffic control device, even when the visibility distance to the device is satisfactory.

An advance street name plaque (see Section 2C.58) may be installed above or below an Advance Traffic Control sign.

A warning beacon may be used with an Advance Traffic Control sign.

A BE PREPARED TO STOP (W3-4) sign may be used to warn of stopped traffic caused by a traffic control signal or in advance of a section of roadway that regularly experiences traffic congestion.

### STANDARD:

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

### OPTION:

The BE PREPARED TO STOP sign may be supplemented with a warning beacon (see Section 4L.3).

### STANDARD:

When the warning beacon is interconnected with a traffic control signal or queue detection system, the BE PREPARED TO STOP sign shall be supplemented with a WHEN FLASHING plaque (W3-X2) or use the PREPARE TO STOP WHEN FLASHING sign (W3-X4). See Section 4M.

### SUPPORT:

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

## 2C.37 Advance Ramp Control Signal Signs (W3-7, W3-8)



### OPTION:

A RAMP METER AHEAD (W3-7) sign may be used to warn road users that a freeway entrance ramp is metered and that they will encounter a ramp control signal (see Chapter 4I).

### GUIDANCE:

When the ramp control signals are operated only during certain periods of the day, a RAMP METERED WHEN FLASHING (W3-8) sign 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.

**STANDARD:**

The RAMP METERED WHEN FLASHING sign shall be supplemented with a warning beacon (see Section 4L.3) that flashes when the ramp control signal is in operation.

**2C.38 Reduced Speed Limit Ahead Signs (W3-5, W3-5a)**



W3-5



W3-5a

**GUIDANCE:**

A Reduced Speed Limit Ahead (W3-5 or W3-5a) sign should be used to inform road users of a reduced speed zone where the speed limit is being reduced by more than 10 mph, or where engineering judgment indicates the need for advance notice to comply with the posted speed limit ahead.

**STANDARD:**

If used, Reduced Speed Limit Ahead signs shall be followed by a Speed Limit (R2-1) sign installed at the beginning of the zone where the speed limit applies.

The speed limit displayed on the Reduced Speed Limit Ahead sign shall be identical to the speed limit displayed on the subsequent Speed Limit sign.

**2C.39 DRAW BRIDGE Sign (W3-6)**



W3-6

**STANDARD:**

A DRAW BRIDGE (W3-6) sign shall be used in advance of movable bridge signals and gates (see Section 4J.2) to give warning to road users, except in urban conditions where such signing would not be practical.

**2C.40 Merge Signs (W4-1)**



W4-1

**OPTION:**

A Merge (W4-1) sign may be used to warn road users on the major roadway that merging movements might be encountered in advance of a point where lanes from two separate roadways converge as a single traffic lane and no turning conflict occurs.

A Merge sign may also be installed on the side of the entering roadway to warn road users on the entering roadway of the merge condition.

**GUIDANCE:**

The Merge sign should be installed on the side of the major roadway where merging traffic will be encountered and in such a position as to not obstruct the road user's view of entering traffic.

Where two roadways of approximately equal importance converge, a Merge sign should be placed on each roadway.

When a Merge sign is to be installed on an entering roadway that curves before merging with the major roadway, such as a ramp with a curving horizontal alignment as it approaches the major roadway, the Entering Roadway Merge (W4-5) sign should be used to better portray the actual geometric conditions to road users on the entering roadway.

The Merge sign should not be used where two roadways converge and merging movements are not required.

The Merge sign should not be used in place of a Lane Ends sign (see Section 2C.42) where lanes of traffic moving on a single roadway must merge because of a reduction in the actual or usable pavement width.

**OPTION:**

For a yield-controlled channelized right-turn movement onto a roadway without an acceleration lane, a NO MERGE AREA (W4-5P) supplemental plaque may be mounted below a Yield Ahead (W3-2) sign and/or below a YIELD (R1-2) sign when engineering judgment indicates that road users would expect an acceleration lane to be present. (see Section 2B.9 for YIELD sign applications)

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## 2C.41 Added Lane Sign (W4-3, W4-6)



W4-3



W4-6

### GUIDANCE:

The Added Lane (W4-3) sign should be installed in advance of a point where two roadways converge and merging movements are not required. When possible, the Added Lane sign should be placed such that it is visible from both roadways; if this is not possible, an Added Lane sign should be placed on the side of each roadway.

When an Added Lane sign is to be installed on a roadway that curves before converging with another roadway that has a tangent alignment at the point of convergence, the Entering Roadway Added Lane (W4-6) sign should be used to better portray the actual geometric conditions to road users on the curving roadway.

## 2C.42 Lane Ends Signs

(W4-2, W9-1, W9-2)



W4-2



W9-1



W9-2

### GUIDANCE:

The LANE ENDS MERGE RIGHT (LEFT) (W9-2) sign or the Lane Ends (W4-2) sign should be used to warn of the reduction in the number of traffic lanes in the direction of travel on a multi-lane highway.

### OPTION:

The RIGHT (LEFT) LANE ENDS (W9-1) sign may be used in advance of the Lane Ends (W4-2) sign or the LANE ENDS MERGE LEFT (RIGHT) (W9-2) sign as additional warning or to emphasize that the traffic lane is ending and that a merging maneuver will be required.

### GUIDANCE:

If used, the RIGHT (LEFT) LANE ENDS (W9-1) sign should be installed adjacent to the Lane-Reduction Arrow pavement markings.

### OPTION:

On one-way streets or on divided highways where the width of the median will permit, two Lane Ends signs may be placed facing approaching traffic, one on the right-hand side and the other on the left-hand side or median.

### SUPPORT:

Section 3B.9 contains information regarding the use of pavement markings in conjunction with a lane reduction.

### GUIDANCE:

Where an extra lane has been provided for slower moving traffic (see Section 2B.31), a Lane Ends word sign or a Lane Ends (W4-2) symbol sign should be installed in advance of the downstream end of the extra lane.

Lane Ends signs should not be installed in advance of the downstream end of an acceleration lane.

### STANDARD:

In dropped lane situations, regulatory signs (see Section 2B.20) shall be used to inform road users that a through lane is becoming a mandatory turn lane. The W4-2, W9-1, and W9-2 signs shall not be used in dropped lane situations.

## 2C.43 RIGHT (LEFT) LANE EXIT ONLY AHEAD Sign (W9-7)



W9-7

### OPTION:

The RIGHT (LEFT) LANE EXIT ONLY AHEAD (W9-7) sign may be used to provide advance warning to road users that traffic in the right-hand (left-hand) lane of a roadway that is approaching a grade-separated interchange will be required to depart the roadway on an exit ramp at the next interchange.

### STANDARD:

The W9-7 sign shall be a horizontal rectangle with a black legend and border on a yellow background.

**GUIDANCE:**

If used, the W9-7 sign should be installed upstream from the first overhead guide sign that contains an EXIT ONLY sign panel or upstream from the first RIGHT (LEFT) LANE MUST EXIT (R3-33) regulatory sign, whichever is farther upstream from the exit.

**SUPPORT:**

Section 2B.23 contains information regarding a regulatory sign that can also be used for lane drops at grade-separated interchanges.

**2C.44 Two-Way Traffic Sign (W6-3)**



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**GUIDANCE:**

A Two-Way Traffic (W6-3) sign should be used to warn road users of a transition from a multi-lane divided section of roadway to a two-lane, two-way section of roadway.

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A Two-Way Traffic (W6-3) sign with an AHEAD (W16-9P) plaque should be used to warn road users of a transition from a one-way street to a two-lane, two-way section of roadway (see Figure 2B-14).

**OPTION:**

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The Two-Way Traffic sign may be used at intervals along a two-lane, two-way roadway.

**2C.45 NO PASSING ZONE Sign (W14-3)**



W14-3

**STANDARD:**

The NO PASSING ZONE (W14-3) sign shall be a pennant-shaped isosceles triangle with its longer axis horizontal and pointing to the right. When used, the NO PASSING ZONE sign shall be installed on the left side of the roadway at the beginning of no-passing zones identified by pavement markings or DO NOT PASS signs or both (see Sections 2B.29 and 3B.2).

**2C.46 Intersection Warning Signs (W2-1 through W2-8)**



W2-1



W2-2



W2-3



W2-4



W2-5



W2-7L



W2-7R



W2-8

**OPTION:**

A Cross Road (W2-1) symbol, Side Road (W2-2 or W2-3) symbol, T-Intersection symbol (W2-4), or Y-Intersection symbol (W2-5) sign may be used in advance of an intersection to indicate the presence of an intersection and the possibility of turning or entering traffic.

The Circular Intersection (W2-6) symbol sign may be installed in advance of a circular intersection (see Figures 2B-21 through 2B-23).

**GUIDANCE:**

If an approach to a roundabout has a statutory or posted speed limit of 40 mph or higher, the Circular Intersection (W2-6) symbol sign should be installed in advance of the circular intersection.



W2-6



W16-12P



W16-17P

**OPTION:**

A ROUNDABOUT (W16-17P) educational plaque may be mounted above or below a circular intersection symbol sign on the approach to a roundabout but may not be used on an approach to a traffic circle.

A TRAFFIC CIRCLE (W16-12P) educational plaque may be mounted above or below a circular intersection symbol sign on the approach to a traffic circle but may not be used on an approach to a roundabout.

The relative importance of the intersecting roadways may be shown by different widths of lines in the symbol.

An advance street name plaque (see Section 2C.49) may be installed above or below an Intersection Warning sign.

**GUIDANCE:**

The Intersection Warning sign should illustrate and depict the general configuration of the intersecting roadway, such as cross road, side road, T-intersection, or Y-intersection.

Intersection Warning signs, other than the Circular Intersection (W2-6) symbol sign and the T-Intersection (W2-4) symbol sign should not be used on approaches controlled by STOP signs, YIELD signs, or signals.

If an Intersection Warning sign is used where the side roads are not opposite of each other, Offset Side Roads (W2-7) symbol sign should be used instead of the Cross Road symbol sign.

If an Intersection Warning sign is used where two closely-spaced side roads are on the same side of the highway, the Double Side Roads (W2-8) symbol sign should be used instead of the Side Road symbol sign.

No more than two side road symbols should be displayed on the same side of the highway on a W2-7 or W2-8 symbol sign, and no more than three side road symbols should be displayed on a W2-7 or W2-8 symbol sign.

### 2C.47 Two-Direction Large Arrow Sign (W1-7)



W1-7

**STANDARD:**

The Two-Direction Large Arrow (W1-7) sign shall be a horizontal rectangle.

If used, it shall be installed on the far side of a T-intersection in line with, and at approximately a right angle to, traffic approaching from the stem of the T-intersection.

The Two-Direction Large Arrow sign shall not be used where there is no change in the direction of travel such as at the beginnings and ends of medians or at center piers.

The Two-Direction Large Arrow sign directing traffic to the left and right shall not be used in the central island of a roundabout.

**GUIDANCE:**

The Two-Direction Large Arrow sign should be visible for a sufficient distance to provide the road user with adequate time to react to the intersection configuration.

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**2C.48 Traffic Signal Signs (W25-1, W25-2)**



W25-1



W25-2

**STANDARD:**

At locations where either a W25-1 or a W25-2 sign is required based on the provisions in Section 4D.05, the W25-1 or W25-2 sign shall be installed near the left-most signal head. The W25-1 and W25-2 signs shall be vertical rectangles.

**2C.49 Vehicular Traffic Signs (W8-6, W11-1, W11-5, W11-5a, W11-6, W11-8, W11-10, W11-11, W11-12p, W11-14, W11-15, W11-15a, W11-15P, W11-X3,)**



W8-6



W11-1



W11-1



W11-5



W11-5a



W11-6



W11-10



W11-11



W11-14



W11-8



W11-15



W11-15



W11-15a



W11-15a



W11-X3



W11-15P



W11-15P



W11-12P



W16-13P

**OPTION:**

Vehicular Traffic Warning (W8-6, W11-1, W11-5, W11-5a, W11-6, W11-8, W11-11, W11-12P, W11-14, W11-15, and W11-15a, W11-X3) signs may be used to alert road users to locations where unexpected entries into the roadway by trucks, bicyclists, farm vehicles, snowmobiles, emergency vehicles, golf carts, horse-drawn vehicles, or other vehicles might occur.

**SUPPORT:**

These locations might be relatively confined or might occur randomly over a segment of roadway.

**GUIDANCE:**

Vehicular Traffic Warning signs should be used only at locations where the road user's sight distance is restricted, or the condition, activity, or entering traffic would be unexpected.

If the condition or activity is seasonal or temporary, the Vehicular Traffic Warning signs should be removed or covered when the condition or activity does not exist.

**OPTION:**

The combined Bicycle/Pedestrian (W11-15) sign may be used where both bicyclists and pedestrians might be crossing the roadway, such as at an intersection with a shared-use path. A TRAIL X-ING (W11-15P) supplemental plaque may be mounted below the W11-15 sign. The TRAIL CROSSING (W11-15a) sign may be used to warn of shared-use path crossings where pedestrians, bicyclists, and other user groups might be crossing the roadway.

The W11-1, W11-15, and W11-15a signs and their related supplemental plaques may have a fluorescent yellow-green background with a black legend and border.

Supplemental plaques (see Section 2C.53) with legends such as AHEAD, XX FEET, NEXT XX MILES, or SHARE THE ROAD may be mounted below Vehicular Traffic Warning signs to provide advance notice to road users of unexpected entries.

**GUIDANCE:**

If used in advance of a pedestrian and bicycle crossing, a W11-15 or W11-15a sign should be supplemented with an AHEAD or XX FEET plaque to inform road users that they are approaching a point where crossing activity might occur.

**STANDARD:**

If a post-mounted W11-1, W11-6, W11-11, W11-15, or W11-15a sign is placed at the location of the crossing point where golf carts, pedestrians, bicyclists, or other shared-use path users might be crossing the roadway, a diagonal downward pointing arrow (W16-7P) plaque shall be mounted below the sign. If the W11-1, W11-6, W11-11, W11-15, or W11-15a sign is mounted overhead, the W16-7P supplemental plaque shall not be used.

**OPTION:**

The crossing location identified by a W11-1, W11-6, W11-11, W11-15, or W11-15a sign may be defined with crosswalk markings (see Section 3B.18).

**STANDARD:**

The Emergency Vehicle (W11-8) sign with the EMERGENCY SIGNAL AHEAD (W11-12P) supplemental plaque shall be placed in advance of all emergency-vehicle traffic control signals (see Chapter 4F).

**OPTION:**

The Emergency Vehicle (W11-8) sign, or a word message sign indicating the type of emergency vehicle (such as rescue squad), may be used in advance of the emergency vehicle station when no emergency-vehicle traffic control signal is present.

A Warning Beacon (see Section 4L.3) may be used with any Vehicular Traffic Warning sign to indicate specific periods when the condition or activity is present or is likely to be present, or to provide enhanced sign conspicuity.

A supplemental WHEN FLASHING (W16-13P) plaque may be used with any Vehicular Traffic Warning sign that is supplemented with a Warning Beacon to indicate specific periods when the condition or activity is present or is likely to be present.

**2C.50 Non-Vehicular Signs  
(W11-2, W11-3, W11-4, W11-7,  
W11-9, W11-16 through W11-22)**



W11-2



W11-2



W11-3



W11-4



W11-7



W11-9



W11-9



W11-16



W11-17



W11-18



W11-19



W11-20



W11-21



W11-22

**OPTION:**

Non-Vehicular Warning (W11-2, W11-3, W11-4, W11-7, W11-9, and W11-16 through W11-22) signs may be used to alert road users in advance of locations where unexpected entries into the roadway might occur or where shared use of the roadway by pedestrians, animals, or equestrians might occur.

**SUPPORT:**

These conflicts might be relatively confined, or might occur randomly over a segment of roadway.

**GUIDANCE:**

If used in advance of a pedestrian, snowmobile, or equestrian crossing, the W11-2, W11-7, and W11-9 signs should be supplemented with plaques (see Section 2C.55) with the legend AHEAD or XX FEET to inform road users that they are approaching a point where crossing activity might occur.



**STANDARD:**

If a post-mounted W11-2, W11-6, W11-7, or W11-9 sign is placed at the location of the crossing point where pedestrians, snowmobilers, or equestrians might be crossing the roadway, a diagonal downward pointing arrow (W16-7P) plaque shall be mounted below the sign. If the W11-2, W11-7, or W11-9 sign is mounted overhead, the W16-7P plaque shall not be used.

**OPTION:**

A Pedestrian Crossing (W11-2) sign may be placed overhead or may be post-mounted with a diagonal downward pointing arrow (W16-7P) plaque at the crosswalk location where Yield Here To (Stop Here For) Pedestrians signs (see Section 2B.11) have been installed in advance of the crosswalk.

**STANDARD:**

If a W11-2 sign has been post-mounted at the crosswalk location where a Yield Here To (Stop Here For) Pedestrians sign is used on the approach, the Yield Here To (Stop Here For) Pedestrians sign shall not be placed on the same post as or block the road user's view of the W11-2 sign.

**OPTION:**

An advance Pedestrian Crossing (W11-2) sign with an AHEAD or a distance supplemental plaque may be used in conjunction with a Yield Here To (Stop Here For) Pedestrians sign on the approach to the same crosswalk.

The crossing location identified by a W11-2, W11-7, or W11-9 sign may be defined with crosswalk markings (see Section 3B.18).

The W11-2 and W11-9 signs and their related supplemental plaques may have a fluorescent yellow-green background with a black legend and border.

Pedestrian and School Crossing signs and their related supplemental plaques may have a fluorescent yellow-green background with a black legend and border.

**GUIDANCE:**

When a fluorescent yellow-green background is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a selected site area should be avoided.

Non-vehicular signs should be used only at locations where the crossing activity is unexpected or at locations not readily apparent.

Additional information on crossings can be found in the following sections:

- Section 7B School Crossing sign
- Section 9B Bicycle Crossing sign
- Appendix B Warrants, Standards, and Guidelines for Traffic Control Devices used at Senior Citizen and Disabled Persons Crossings

**OPTION:**

A Warning Beacon (see Section 4L.3) may be used with any Non-Vehicular Warning sign to indicate specific periods when the condition or activity is present or is likely to be present, or to provide enhanced sign conspicuity.

A supplemental WHEN FLASHING (W16-13P) plaque may be used with any Non-Vehicular Warning sign that is supplemented with a Warning Beacon to indicate specific periods when the condition or activity is present or is likely to be present.

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## 2C.51 Playground Sign (W15-1)



### OPTION:

The Playground (W15-1) sign may be used to give advance warning of a designated children's playground that is located adjacent to the road.

The Playground sign may have a fluorescent yellow-green background with a black legend and border.

### GUIDANCE:

If the access to the playground area requires a roadway crossing, the application of crosswalk pavement markings (see Section 3B.18) and Non-Vehicular Warning signs (see Section 2C.50) should be considered.

## 2C.52 NEW TRAFFIC PATTERN AHEAD Sign (W23-2)



### OPTION:

A NEW TRAFFIC PATTERN AHEAD (W23-2) sign may be used on the approach to an intersection or along a section of roadway to provide advance warning of a change in traffic patterns, such as revised lane usage, roadway geometry, or signal phasing.

### GUIDANCE:

The NEW TRAFFIC PATTERN AHEAD sign should be removed when the traffic pattern returns to normal, when the changed pattern is no longer considered to be new, or within six months.

## 2C.53 Use of Supplemental Warning Plaques

### OPTION:

A supplemental warning plaque may be displayed with a warning or regulatory sign when engineering judgment indicates that road users require additional warning information beyond that contained in the main message of the warning or regulatory sign.

### STANDARD:

Supplemental warning plaques shall be used only in combination with warning or regulatory signs. They shall not be mounted alone or displayed alone. If used, a supplemental warning plaque shall be installed on the same post(s) as the warning or regulatory sign that it supplements.

Unless otherwise provided in this Manual for a particular plaque, supplemental warning plaques shall be mounted below the sign they supplement.

## 2C.54 Design of Supplemental Warning Plaques

### STANDARD:

A supplemental warning plaque used with a warning sign shall have the same legend, border, and background color as the warning sign with which it is displayed. A supplemental warning plaque used with a regulatory sign shall have a black legend and border on a yellow background.

Supplemental warning plaques shall be square or rectangular.

**2C.55 Distance Plaques**  
(W16-2 series, W16-3 series,  
W16-4P, W7-3aP)

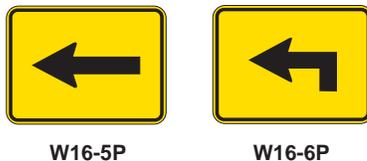


**OPTION:**

The Distance Ahead (W16-2 series and W16-3 series) plaques may be used to inform the road user of the distance to the condition indicated by the warning sign.

The Next Distance (W7-3aP and W16-4P) plaques may be used to inform road users of the length of roadway over which the condition indicated by the warning sign exists.

**2C.56 Supplemental Arrow Plaques**  
(W16-5P, W16-6P)



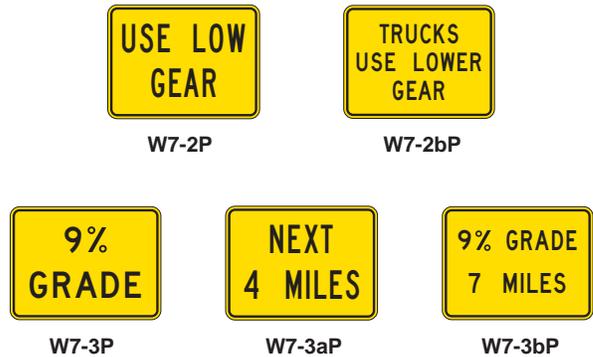
**GUIDANCE:**

If the condition indicated by a warning sign is located on an intersecting road and the distance between the intersection and condition is not sufficient to provide adequate advance placement of the warning sign, a Supplemental Arrow (W16-5P or W16-6P) plaque should be used below the warning sign.

**STANDARD:**

Supplemental Arrow plaques shall have the same legend design as the Advance Turn Arrow and Directional Arrow auxiliary signs (see Sections 2D.26 and 2D.28) except that they shall have a black legend and border on a yellow or fluorescent yellow-green background, as appropriate.

**2C.57 Hill-Related Plaques**  
(W7-2 Series and W7-3 Series)



**GUIDANCE:**

Hill-Related (W7-2 series, W7-3 series) plaques or other appropriate legends and larger signs should be used for emphasis or where special hill characteristics exist.

On longer grades, the use of the distance plaque (W7-3aP or W7-3bP) at periodic intervals of approximately 1-mile spacing should be considered.

**2C.58 Advance Street Name Plaque**  
(W16-8P, W16-8aP)



**OPTION:**

An Advance Street Name (W16-8P or W16-8aP) plaque may be used with any Intersection sign (W2 series, W10-2, W10-3, or W10-4) or Advance Traffic Control (W3 series) sign to identify the name of the intersecting street. Advance Street Name plaques may be mounted above or below the sign.

**STANDARD:**

The lettering on Advance Street Name plaques shall be composed of a combination of lower-case letters with initial upper-case letters.

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If two street names are used on the Advance Street Name plaque, a directional arrow pointing in the direction of the street shall be placed next to each street name. Arrows pointing to the left shall be placed to the left of the street name, and arrows pointing to the right shall be placed to the right of the street name.

**GUIDANCE:**

If two street names are used on the Advance Street Name plaque, the street names and associated arrows should be displayed in the following order:

- A. For a single intersection, the name of the street to the left should be displayed above the name of the street to the right; or
- B. For two sequential intersections, such as where the plaque is used with an Offset Side Roads (W2-7) or a Double Side Road (W2-8) symbol sign, the name of the first street encountered should be displayed above the name of the second street encountered, and the arrow associated with the second street encountered should be an advance arrow, such as the arrow shown on the W16-6P arrow plaque.

**2C.59 CROSS TRAFFIC DOES NOT STOP Plaque (W4-4P Series)**



**OPTION:**

The CROSS TRAFFIC DOES NOT STOP (W4-4P) plaque may be used in combination with a STOP sign when engineering judgment indicates that conditions are present that are causing or could cause drivers to misinterpret the intersection as an all-way stop.

Alternate messages such as TRAFFIC FROM LEFT (RIGHT) DOES NOT STOP (W4-4aP) or ONCOMING TRAFFIC DOES NOT STOP (W4-4bP) may be used when such messages more accurately describe the traffic controls established at the intersection.

**GUIDANCE:**

Plaques with the appropriate alternative messages of TRAFFIC FROM LEFT (RIGHT) DOES NOT STOP or ONCOMING TRAFFIC DOES NOT STOP should be used at intersections where STOP signs control all but one approach to the intersection, unless the only non-stopped approach is from a one-way street.

**STANDARD:**

If a W4-4P plaque or a plaque with an alternative message is used, it shall be mounted below the STOP sign.

**OPTION:**

A double-headed arrow may be included within the plaque (W4-4P) except at one-way crossings.

**STANDARD:**

A single headed arrow shall not be used.

**2C.60 SHARE THE ROAD Plaque (W16-1P)**



W16-1P

**OPTION:**

In situations where there is a need to warn drivers to watch for other slower forms of transportation traveling along the highway, such as bicycles, golf carts, horse-drawn vehicles, or farm machinery, a SHARE THE ROAD (W16-1P) plaque may be used.

**STANDARD:**

A W16-1P plaque shall not be used alone. If a W16-1P plaque is used, it shall be mounted below either a Vehicular Traffic Warning sign (see Section 2C.49) or a Non-Vehicular Warning sign (see Section 2C.50). The background color of the W16-1P plaque shall match the background color of the warning sign with which it is displayed.

## 2C.61 PHOTO ENFORCED Plaque (W16-10P, W16-10aP)



### OPTION:

A Photo Enforced (W16-10P) plaque or a PHOTO ENFORCED (W16-10aP) word message plaque may be mounted below a warning sign to advise road users that the regulations associated with the condition being warned about (such as a traffic control signal or a toll plaza) are being enforced by photographic equipment.

### STANDARD:

If used below a warning sign, the Photo Enforced (W16-10P or W16-10aP) plaque shall be a rectangle with a black legend and border on a yellow background.

## 2C.62 NEW Plaque (W16-15P)



W16-15P

### OPTION:

A NEW (W16-15P) plaque may be mounted above a regulatory sign when a new regulation takes effect in order to alert road users to the new traffic regulation. A NEW plaque may also be mounted above an advance warning sign (such as a Signal Ahead sign for a newly-installed traffic control signal) for a new traffic regulation.

### STANDARD:

The NEW plaque shall not be used alone.

The NEW plaque shall be removed no later than 6 months after the regulation has been in effect.

## 2C.63 Object Marker Design and Placement Height

### SUPPORT:

Type 1, 2, and 3 object markers are used to mark obstructions within or adjacent to the roadway. Type 4 object markers are used to mark the end of a roadway.

### STANDARD:

When used, object markers shall not have a border and shall consist of an arrangement of one or more of the following types:

Type 1-a diamond-shaped sign, at least 18 inches on a side, consisting of either a yellow (OM1-1) or black (OM1-2) sign with nine yellow retroreflective devices, each with a minimum diameter of 3 inches, mounted symmetrically on the sign, or an all-yellow retroreflective sign (OM1-3).

Type 2-either a marker (OM2-1V or OM2-1H) consisting of three yellow retroreflective devices, each with a minimum diameter of 3 inches, arranged either horizontally or vertically on a white sign measuring at least 6 x 12 inches; or an all-yellow horizontal or vertical retroreflective sign (OM2-2V or OM2-2H), measuring at least 6 x 12 inches.

Type 3-a striped marker, 12 x 36 inches, consisting of a vertical rectangle with alternating black and retroreflective yellow stripes sloping downward at an angle of 45 degrees toward the side of the obstruction on which traffic is to pass. The minimum width of the yellow and black stripes shall be 3 inches.

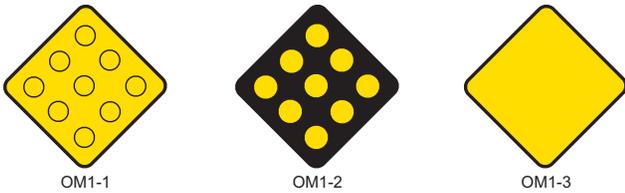
Type 4-a diamond-shaped sign, at least 18 inches on a side, consisting of either a red (OM4-1) or black (OM4-2) sign with nine red retroreflective devices, each with a minimum diameter of 3 inches, mounted symmetrically on the sign, or an all-red retroreflective sign (OM4-3).

### SUPPORT:

A better appearance can be achieved if the black stripes are wider than the yellow stripes.

Type 3 object markers with stripes that begin at the upper right side and slope downward to the lower left side are designated as right object markers (OM3-R). Object markers with stripes that begin at the upper left side and slope downward to the lower right side are designated as left object markers (OM3-L).

**Type 1 Object Markers  
(obstructions within the roadway)**



OM1-1

OM1-2

OM1-3

**Type 2 Object Markers  
(obstructions adjacent to the roadway)**



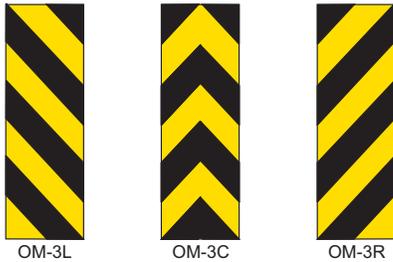
OM2-1V

OM2-2V

OM2-1H

OM2-2H

**Type 3 Object Markers  
(obstructions adjacent to or within the roadway)**

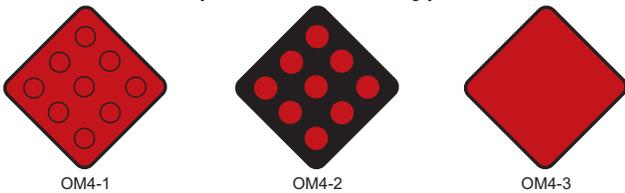


OM3-L

OM3-C

OM3-R

**Type 4 Object Markers  
(end of roadway)**



OM4-1

OM4-2

OM4-3

**Figure 2C-13 Object Markers**

**GUIDANCE:**

When used for marking obstructions within the roadway or obstructions that are 8 feet or less from the shoulder or curb, the minimum mounting height, measured from the bottom of the object marker to the elevation of the near edge of the traveled way, should be 4 feet. When used to mark obstructions more than 8 feet from the shoulder or curb, the clearance from the ground to the bottom of the object marker should be at least 4 feet.

Object markers should not present a vertical or horizontal clearance obstacle for pedestrians.

**OPTION:**

When object markers or markings are applied to an obstruction that by its nature requires a lower or higher mounting, the vertical mounting height may vary according to need.

**SUPPORT:**

Section 9B.26 contains information regarding the use of object markers on shared-use paths.

**2C.64 Object Markers for Obstructions Within the Roadway**

**STANDARD:**

Obstructions within the roadway shall be marked with a Type 1 or Type 3 object marker. In addition to markers on the face of the obstruction, warning of approach to the obstruction shall be given by appropriate pavement markings (see Section 3B.10).

**OPTION:**

Object markers may be installed alone or in combination with signs (such as KEEP RIGHT, KEEP LEFT, double arrows, or guide signs) located within the the island.

To provide additional emphasis, a Type 1 or Type 3 object marker may be installed at or near the approach end of a median island.

To provide additional emphasis, large surfaces such as bridge piers may be painted with diagonal stripes, 12 inches or greater in width, similar in design to the Type 3 object marker.

**STANDARD:**

The alternating black and retroreflective yellow stripes (OM3-L, OM3-R) shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction. If traffic can pass to either side of the obstruction, the alternating black and retroreflective yellow stripes (OM3-C) shall form chevrons that point upwards.

**OPTION:**

Appropriate signs (see Sections 2B.32 and 2C.25) directing traffic to one or both sides of the obstruction may be used instead of the object marker.

## 2C.65 Object Markers for Obstructions Adjacent to the Roadway

### SUPPORT:

Obstructions not actually within the roadway are sometimes so close to the edge of the road that they need a marker. These include underpass piers, bridge abutments, handrails, ends of traffic barriers, utility poles, and culvert headwalls. In other cases there might not be a physical object involved, but other roadside conditions exist, such as narrow shoulders, drop-offs, gores, small islands, and abrupt changes in the roadway alignment, that might make it undesirable for a road user to leave the roadway, and therefore would create a need for a marker.

### STANDARD:

If a Type 2 or Type 3 object marker is used to mark an obstruction adjacent to the roadway, the edge of the object marker that is closest to the road user shall be installed in line with the closest edge of the obstruction.

Where Type 3 object markers are applied to the approach ends of guardrail and other roadside appurtenances, sheeting without a substrate shall be directly affixed to the approach end of the guardrail in a rectangular shape conforming to the size of the approach end of the guardrail with alternating black and retroreflective yellow stripes sloping downward at an angle of 45 degrees toward the side of the obstruction on which traffic is to pass.

Type 1 and Type 4 object markers shall not be used to mark obstructions adjacent to the roadway.

### GUIDANCE:

Standard warning signs in this Chapter should also be used where applicable.

## 2C.66 Object Markers for Ends of Roadways

### SUPPORT:

The Type 4 object marker is used to warn and alert road users of the end of a roadway in other than construction or maintenance areas.

### STANDARD:

If an object marker is used to mark the end of a roadway, a Type 4 object marker shall be used.

### OPTION:

The Type 4 object marker may be used in instances where there are no alternate vehicular paths.

Where conditions warrant, more than one marker, or a larger marker with or without a Type 3 Barricade (see Section 2B.67), may be used at the end of the roadway.

### STANDARD:

The minimum mounting height, measured vertically from the bottom of a Type 4 object marker to the elevation of the near edge of the traveled way, shall be 4 feet.

### GUIDANCE:

Appropriate advance warning signs in this Chapter should be used.

Type of Mounting	Type of Street or Highway	Speed Limit	Recommended Minimum Letter Height	
			Initial Upper-Case	Lower-Case
Overhead	All types	All speed limits	12 inches	9 inches
Post-Mounted	Multi-lane	More than 40 mph	8 inches	6 inches
Post Mounted	Multi-lane	40 mph or less	6 inches	4.5 inches
Post-Mounted	2-lane	All speed limits	6 inches*	4.5 inches*

\* On local two-lane streets with speed limits of 25 mph or less, 4-inch initial upper-case letters with 3-inch lower-case letters may be used.

**Table 2D-2. Recommended Minimum Letter Heights on Street Name Signs**

### 2D.43 Street Name Sign (D3-1or D3-1a)

**GUIDANCE:**

Street Name (D3-1 or D3-1a) signs should be installed in urban areas at all street intersections regardless of other route signs that might be present and should be installed in rural areas to identify important roads that are not otherwise signed.

**OPTION:**

For streets that are part of a U.S., State, or county numbered route, a D3-1a Street Name sign that incorporates a route shield may be used to assist road users who might not otherwise be able to associate the name of the street with the route number.

**STANDARD:**

The lettering for names of streets and highways on Street Name signs shall be composed of a combination of lower-case letters with initial upper-case letters (see Section 2A.13).

**GUIDANCE:**

Lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 6 inches in height and lower-case letters at least 4.5 inches in height.

On multi-lane streets with speed limits greater than 40 mph, the lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 8 inches in height and lower-case letters at least 6 inches in height.



D3-1



D3-1a

**OPTION:**

For local roads with speed limits of 25 mph or less, the lettering on post-mounted Street Name signs may be composed of initial upper-case letters at least 4 inches in height and lower-case letters at least 3 inches in height.

**GUIDANCE:**

If overhead Street Name signs are used, the lettering should be composed of initial upper-case letters at least 12 inches in height and lower-case letters at least 9 inches in height.

**SUPPORT:**

The recommended minimum letter heights for Street Name signs are summarized in Table 2D-2.

**OPTION:**

Supplementary lettering to indicate the type of street (such as Street, Avenue, or Road) or the section of the city (such as NW) on the D3-1 and D3-1a signs may be in smaller lettering, composed of initial upper-case letters at least 3 inches in height and lower-case letters at least 2.25 inches in height. Conventional abbreviations (see Section 1A.15) may be used except for the street name itself.

A pictograph (see definition in Section 1A.13) may be used on a D3-1 sign.

**STANDARD:**

Pictographs shall not be displayed on D3-1a or Advance Street Name (D3-2) signs (see Section 2D.44).

If a pictograph is used on a D3-1 sign, the height and width of the pictograph shall not exceed the upper-case letter height of the principal legend of the sign.

MN Rev. 2

MN Rev. 1

MN Rev. 1

**GUIDANCE:**

The pictograph should be positioned to the left of the street name.

**STANDARD:**

The Street Name sign shall be retroreflective or illuminated to show the same shape and similar color both day and night. The color of the legend (and border, if used) shall contrast with the background color of the sign.

**OPTION:**

The border may be omitted from a Street Name sign.

An alternative background color other than the normal guide sign color of green may be used for Street Name (D3-1 or D3-1a) signs where the highway agency determines this is necessary to assist road users in determining jurisdictional authority for roads.

**STANDARD:**

Alternative background colors shall not be used for Advance Street Name (D3-2) signs (see Section 2D.44).

The only acceptable alternative background colors for Street Name (D3-1 or D3-1a) signs shall be blue, brown, or white. Regardless of whether green, blue, or brown is used as the background color for Street Name (D3-1 or D3-1a) signs, the legend (and border, if used) shall be white. For Street Name signs that use a white background, the legend (and border, if used) shall be black.

**GUIDANCE:**

An alternative background color for Street Name signs, if used, should be applied to the Street Name (D3-1 or D3-1a) signs on all roadways under the jurisdiction of a particular highway agency.

In business or commercial areas and on principal arterials, Street Name signs should be placed at least on diagonally opposite corners. In residential areas, at least one Street Name sign should be mounted at each intersection. Signs naming both streets should be installed at each intersection. They should be mounted with their faces parallel to the streets they name.

**OPTION:**

To optimize visibility, Street Name signs may be mounted overhead. Street Name signs may also be placed above a regulatory or STOP or YIELD sign with no required vertical separation.

**GUIDANCE:**

In urban or suburban areas, especially where Advance

Street Name signs for signalized and other major intersections are not used, the use of overhead Street Name signs should be strongly considered.

**OPTION:**

At intersection crossroads where the same road has two different street names for each direction of travel, both street names may be displayed on the same sign along with directional arrows.

On lower speed roadways, historic street name signs within locally identified historic districts that are consistent with the criteria contained in 36 CFR 60.4 for such structures and districts may be used without complying with the provisions of the 1st Standard; 2nd Guidance, 1st paragraph; 2nd Option; 3rd Option, 1st paragraph; 2nd Standard, 2nd paragraph; 4th Guidance; 3rd Standard; 4th Standard, 2nd paragraph; and 5th Guidance of this section.

**SUPPORT:**

Information regarding the use of street names on supplemental plaques for use with intersection-related warning signs is contained in Section 2C.58.

**2D.44 Advance Street Name Sign (D3-2)**

**SUPPORT:**

Advance Street Name (D3-2) signs identify an upcoming intersection. Although this is often the next intersection, it could also be several intersections away in cases where the next signalized intersection is referenced.

**STANDARD:**

Advance Street Name (D3-2) signs, if used, shall supplement rather than be used instead of the Street Name (D3-1) signs at the intersection.



MIN Rev. 1

MIN Rev. 3

Type of Sign	Minimum Size
<b>A. Pull-Through Signs</b>	
Destinations -- Upper-Case Letters	16
Destinations -- Lower-Case Letters	12
Route Signs	
1- or 2- Digit Shields	36 x 36
3-Digit Shields	45 x 36
Cardinal Directions -- First Letters	15
Cardinal Directions -- Rest of Word	12
<b>B. Supplemental Guide Signs</b>	
Exit Number -- Words	10
Exit Number -- Numerals & Letters	15
Place Names -- Upper-Case Letters	13.33
Place Names -- Lower-Case Letters	10
Action Message	8
Route Signs	
Numerals	12
1- or 2-Digit Shield	24 x 24
3-Digit Shield	30 x 24
<b>C. Interchange Sequence or Community Interchanges Identification Signs</b>	
Words -- Upper-Case Letters	13.33
Words -- Lower-Case Letters	10
Numerals	13.33
Fraction Numerals	10
Route Signs	
Numerals	12
1- or 2-Digit Shield	24 x 24
3-Digit Shield	30 x 24
<b>D. Next XX Exits Sign</b>	
Place Names -- Upper-Case Letters	13.33
Place Names -- Lower-Case Letters	10
NEXT XX EXITS -- Words	10
NEXT XX EXITS -- Number	15
<b>E. Distance Signs</b>	
Words -- Upper-Case Letters	8
Words -- Lower-Case Letters	6
Numerals	8
Route Signs	
Numerals	9
1- or 2-Digit Shield	18 x 18
3-Digit Shield	22.5 x 18
<b>F. Next XX Exits Sign</b>	
Exit Numeral Words	10
Exit Number Numerals and Letters	15
Services	10

Type of Sign	Minimum Size
<b>G. Rest Area, Scenic Area, and Roadside Area Signs (see Chapter 2I)</b>	
Words	12
Distance Numerals	15
Distance Fraction Numerals	10
Distance Words	10
Action Message Words	12
<b>H. Reference Location Signs (see Chapter 2H)</b>	
Words	4
Numerals	10
<b>I. Boundary and Orientation Signs (see Chapter 2H)</b>	
Word -- Upper-Case Letters	8
Word -- Lower-Case Letters	6
<b>J. Next Exit and Next Services Signs</b>	
Words and Numerals	8
<b>K. Exit Only Signs</b>	
Words	12
<b>L. Overhead Arrow-Per-Lane Signs</b>	
Arrowhead (Type D Directional Arrow)	21
Arrow Shaft Width	7.75
Arrow Height	
Through	66
Left Only	45
Right Only	45
Optional-Diverge (Through with Left or Right)	66
Optional-Split (Left and Right)	55
Vertical Separator Width	2
Vertical Space between Vertical Separator and Top of Nearest Arrow	8
Horizontal Space between Vertical Separator and Top of Nearest Through Arrow	15
Horizontal Space between Arrow Shaft and EXIT and ONLY Panels	12
EXIT and ONLY Panels	54 x 18
<b>M. Diagrammatic Signs</b>	
Arrowhead (Type D Directional Arrow)	13.5 *
Lane Widths	5
Lane Line Segments	1 x 6
Spacing between Lane Line Segments	6
Stem Height to Upper Point of Departure	30
Horizontal Space between Arrowhead and Route Shield or Destination	12

\* The size shown is the arrowhead width per lane depicted on the corresponding arrow shaft.

Note: Sizes are shown in inches and where applicable are shown as width x height

**Table 2E-5 Minimum Letter and Numeral Sizes for Freeway Guide Signs According to Sign Type**

**SUPPORT:**

A sign mounted over a particular roadway lane to which it applies might have to be limited in horizontal dimension to the width of the lane, so that another sign can be placed over an adjacent lane. The necessity to maintain proper vertical clearance might also place a further limitation on the size of the overhead sign and the legend that can be accommodated.

**2E.15 Interline and Edge Spacing****GUIDANCE:**

Interline spacing of upper-case letters should be approximately three-fourths the average of upper-case letter heights in adjacent lines of letters.

The spacings to the top and bottom borders should be equal to the average of the letter height of the adjacent line of letters. The lateral spacing to the vertical borders should be essentially the same as the height of the largest letter.

**2E.16 Sign Borders****STANDARD:**

Signs shall have a border of the same color as the legend in order to outline their distinctive shape and thereby give them easy recognition and a finished appearance.

**GUIDANCE:**

For guide signs larger than 120 x 72 inches, the border should have a width of 2 inches. For smaller guide signs, a border width of 1.25 inches should be used, but the width should not exceed the stroke width of the lettering of the principal legend on the sign.

Corner radii of sign borders should be 1/8 of the minimum sign dimension on guide signs, except that the radii should not exceed 12 inches on any sign.

**OPTION:**

The sign material in the area outside of the corner radius may be trimmed.

**2E.17 Abbreviations****GUIDANCE:**

Abbreviations should be kept to a minimum; however, they are useful when complete destination messages produce excessively long signs. If used, abbreviations should be unmistakably recognized by road users (see Section 1A.15). Longer commonly used words that are not part of a proper name and are readily recognizable, such as Street, Boulevard, and Avenue, should be abbreviated to expedite recognition of the sign legend by reducing the amount and complexity of the legend.

Periods, apostrophes, question marks, ampersands, or other punctuation or characters that are not letters, numerals, or hyphens should not be used in abbreviations, unless necessary to avoid confusion.

The solidus (slanted line or forward slash) is intended to be used for fractions only and should not be used to separate words on the same line of legend. Instead, a hyphen should be used for this purpose, such as "CARS - TRUCKS."

**STANDARD:**

The words NORTH, SOUTH, EAST, and WEST shall not be abbreviated when used with route signs to indicate cardinal directions on guide signs.

**2E.18 Symbols****STANDARD:**

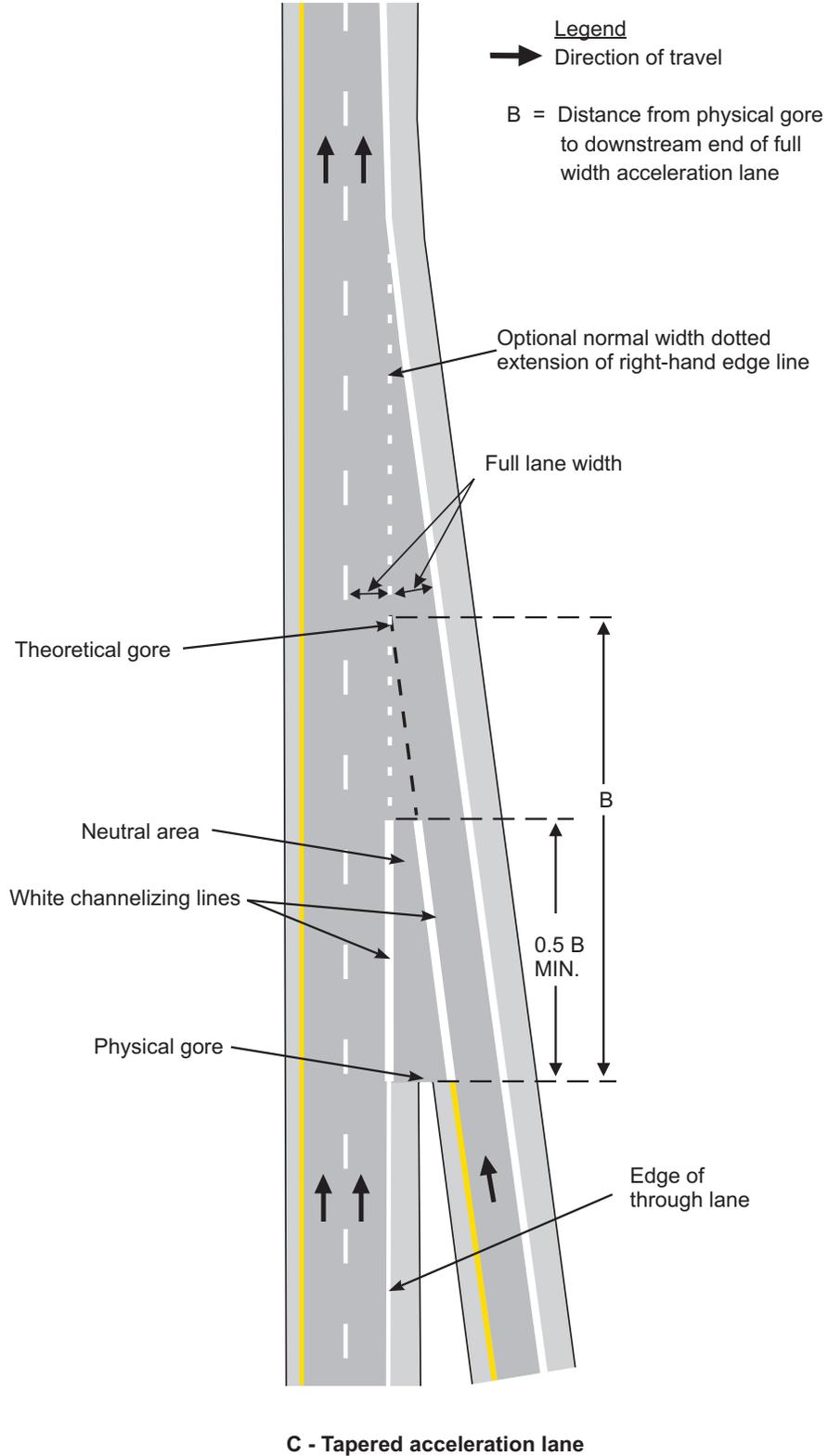
Symbol designs shall be unmistakably like those shown in Appendix C of this Manual and the MnDOT "Standard Signs Manual", and the Federal "Standard Highway Signs and Markings" book.

**GUIDANCE:**

A special effort should be made to balance legend components for maximum legibility of the symbol with the rest of the sign.

**OPTION:**

Educational plaques may be used below symbol signs where needed.



**Figure 3B-9 Examples of Dotted Line and Channelizing Lane Applications for Entrance Ramp Markings**  
 (Sheet 2 of 2)

For entrance ramps with a tapered acceleration lane, a normal width dotted white line extension may be installed from the downstream end of the channelizing line adjacent to the through lane to the downstream end of the acceleration taper, as shown in Drawings B and C of Figure 3B-9.

**STANDARD:**

A wide dotted white lane line shall be used:

- A. As a lane drop marking in advance of lane drops at exit ramps to distinguish a lane drop from a normal exit ramp (see Drawings A, B, and C of Figure 3B-10),
- B. In advance of freeway route splits with dedicated lanes (see Drawing D of Figure 3B-10),
- C. To separate a through lane that continues beyond an interchange from an adjacent auxiliary lane between an entrance ramp and an exit ramp (see Drawing E of Figure 3B-10),
- D. As a lane drop marking in advance of lane drops at intersections to distinguish a lane drop from an intersection through lane (see Drawing A of Figure 3B-11), and
- E. To separate a through lane that continues beyond an intersection from an adjacent auxiliary lane between two intersections (see Drawing B of Figure 3B-11).

**GUIDANCE:**

Lane drop markings used in advance of lane drops at freeway and expressway exit ramps should begin at least 1/2 mile in advance of the theoretical gore.

On the approach to a multi-lane exit ramp having an optional exit lane that also carries through traffic, lane line markings should be used as illustrated in Drawing B of Figure 3B-10. In this case, if the right-most exit lane is an added lane such as a parallel deceleration lane, the lane drop marking should begin at the upstream end of the full-width deceleration lane, as shown in Drawing C of Figure 3B-8.

Lane drop markings used in advance of lane drops at intersections should begin a distance in advance of the intersection that is determined by engineering judgment as suitable to enable drivers who do not desire to make the mandatory turn to move out of the lane being dropped prior to reaching the queue of vehicles that are waiting to make the turn. The lane drop marking should begin no closer to the intersection than the most upstream regulatory or warning sign associated with the lane drop.

The dotted white lane lines that are used for lane drop markings and that are used as a lane line separating through lanes from auxiliary lanes should consist of line segments that are 3 feet in length separated by 9-foot gaps.

**SUPPORT:**

Section 3B.20 contains information regarding other markings that are associated with lane drops, such as lane-use arrow markings and ONLY word markings.

Section 3B.9 contains information about the lane line markings that are to be used for transition areas where the number of through lanes is reduced.

**STANDARD:**

Where crossing the lane line markings is discouraged, the lane line markings shall consist of a normal or wide solid white line.

**OPTION:**

Where it is intended to discourage lane changing on the approach to an exit ramp, a wide solid white lane line may extend upstream from the theoretical gore or, for multi-lane exits, as shown in Drawing B of Figure 3B-10, for a distance that is determined by engineering judgment.

Where lane changes might cause conflicts, a wide or normal solid white lane line may extend upstream from an intersection.

In the case of a lane drop at an exit ramp or intersection, such a solid white line may replace a portion, but not all of the length of the wide dotted white lane line.

**GUIDANCE:**

On approaches to intersections, a solid white lane line marking should be used to separate a through lane from an added mandatory turn lane.

**OPTION:**

On approaches to intersections, solid white lane line markings may be used to separate adjacent through lanes or adjacent mandatory turn lanes from each other.

Where the median width allows the left-turn lanes to be separated from the through lanes to give drivers on opposing approaches a less obstructed view of opposing through traffic, white pavement markings may be used to form channelizing islands as shown in Figure 2B-17.

Solid white lane line markings may be used to separate through traffic lanes from auxiliary lanes, such as an added uphill truck lane or a preferential lane (see Section 3D.2).

Wide solid lane line markings may be used for greater emphasis.

# PART 3. MARKINGS

## Chapter 3C. Roundabout Markings

### 3C.1 General

**SUPPORT:**

A roundabout (see definition in Section 1A.13) is a specific type of circular intersection designed to control speeds and having specific traffic control features.

**GUIDANCE:**

Pavement markings and signing for a roundabout should be integrally designed to correspond to the geometric design and intended lane use of a roundabout.

Markings on the approaches to a roundabout and on the circular roadway should be compatible with each other to provide a consistent message to road users and should facilitate movement through the roundabout such that vehicles do not have to change lanes within the circulatory roadway in order to exit the roundabout in a given direction.

**SUPPORT:**

Figure 3C-1 provides an example of the pavement markings for approach and circulatory roadways at a roundabout. Figure 3C-2 shows the options that are available for lane-use pavement marking arrows on

approaches to roundabouts. Figures 3C-3 through 3C-14 illustrate examples of markings for roundabouts of various geometric and lane-use configurations.

Traffic control signals or pedestrian hybrid beacons (see Part 4) are sometimes used at roundabouts to facilitate the crossing of pedestrians or to meter traffic.

Section 8C.12 contains information about roundabouts that contain or are in close proximity to grade crossings.

### 3C.2 White Lane Line Pavement Markings for Roundabouts

**STANDARD:**

Multi-lane approaches to roundabouts shall have lane lines.

A through lane on a roadway that becomes a dropped lane (mandatory turn lane) at a roundabout shall be marked with a dotted white lane line in accordance with Section 3B.04.

**GUIDANCE:**

Multi-lane roundabouts should have lane line markings within the circulatory roadway to channelize traffic to the appropriate exit lane.

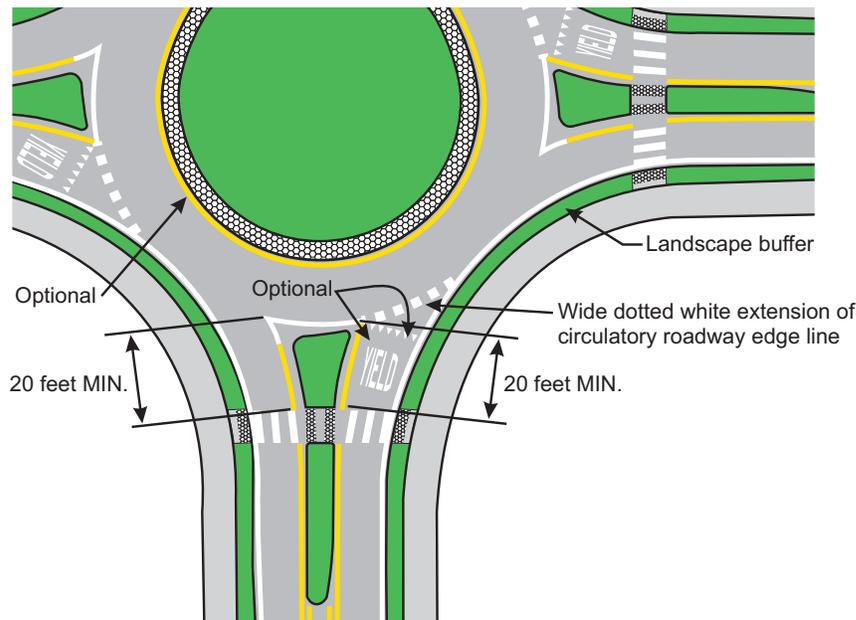
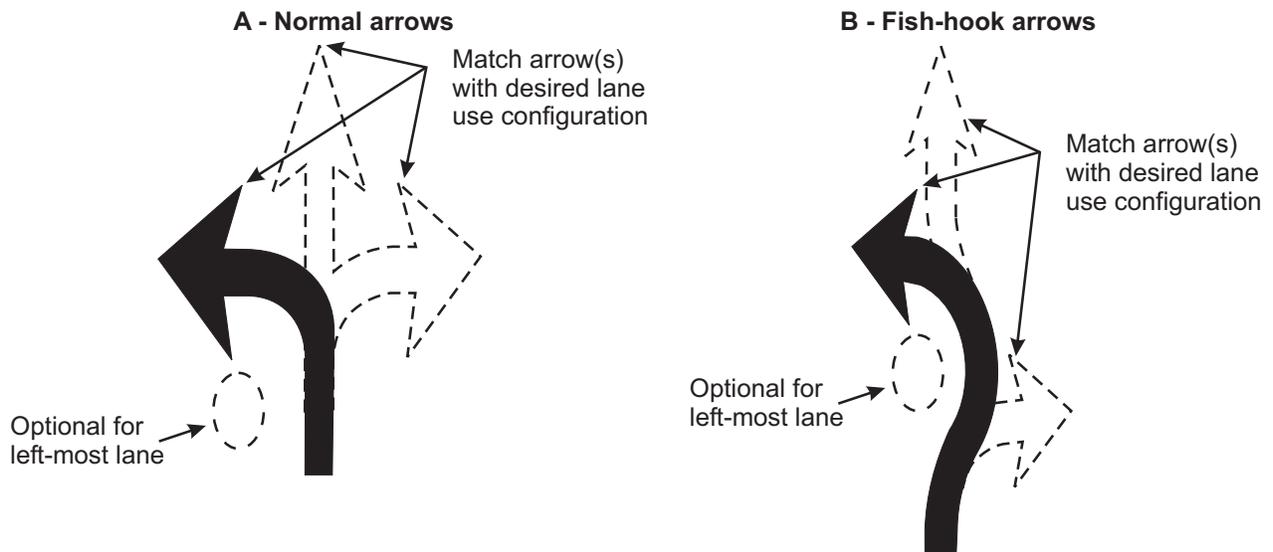
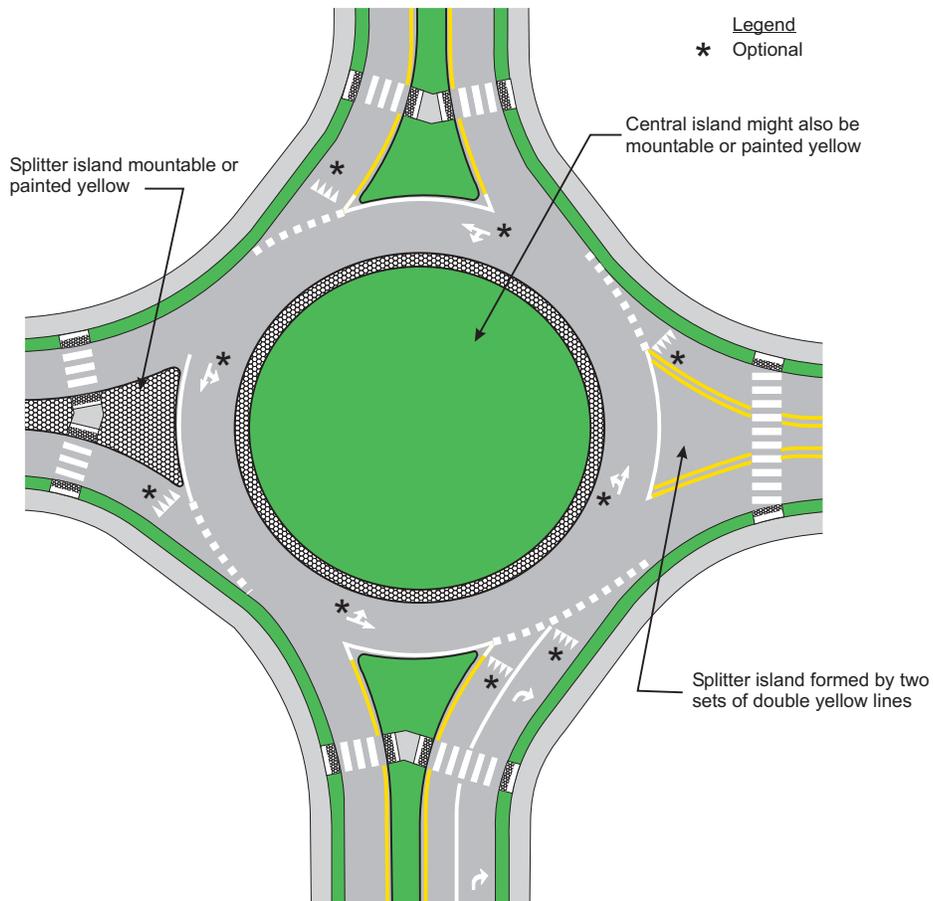


Figure 3C-1 Example of Markings for Approach and Circulatory Roadways at a Roundabout



**Figure 3C-2 Lane-Use Arrow Pavement Marking Optional for Roundabout Approaches**



**Figure 3C-3 Example of Markings for a One-Lane Roundabout**

Emergency-vehicle hybrid beacons shall be placed in a dark mode (no indications displayed) during periods between actuations.

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.

**GUIDANCE:**

The duration of the flashing yellow interval should be determined by engineering judgment.

**STANDARD:**

The duration of the steady yellow change interval shall be determined using engineering practices.

**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.

**OPTION:**

A steady red clearance interval may be used after the steady yellow change interval.

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.

Emergency-vehicle hybrid beacons may be supplemented with an advance warning sign, which may also be supplemented with a Warning Beacon (see Section 4L.3).

**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 dark mode.

**STANDARD:**

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.

**GUIDANCE:**

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.

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.

An emergency-vehicle hybrid beacon should comply with the signal face location provisions described in Sections 4D.11 through 4D.16.

**STANDARD:**

Stop lines and EMERGENCY SIGNAL-STOP ON FLASHING RED (R10-14 or R10-14a) signs (see Section 2B-53) shall be used with emergency-vehicle hybrid beacons.

**OPTION:**

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.



## PART 4. HIGHWAY TRAFFIC SIGNALS

### Chapter 4L. Flashing Beacons

#### 4L.1 General Design and Operation of Flashing Beacons

##### SUPPORT:

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).

##### STANDARD:

Flashing Beacon units and their mountings shall comply with the provisions of Chapter 4D, except as provided in this Chapter.

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  $\frac{1}{2}$  and a maximum of  $\frac{2}{3}$  of the total cycle.

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).

##### GUIDANCE:

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.

##### OPTION:

An automatic dimming device may be used to reduce the brilliance of flashing yellow signal indications during night operation.

#### 4L.2 Intersection Control Beacon

##### STANDARD:

An Intersection Control Beacon shall consist of two or more signal faces mounted overhead directed toward each approach to an intersection to supplement an all-way Stop sign configuration. 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.

Application of Intersection Control Beacon signal indications shall be limited to Red for all approaches.

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).

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.

##### GUIDANCE:

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.

##### OPTION:

Supplemental signal indications may be used on one or more approaches in order to provide adequate visibility to approaching road users.

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.

An Intersection Control Beacon is generally located over the center of an intersection; however, it may be used at other suitable locations.

##### SUPPORT:

Studies have shown that at Intersection Control Beacons 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.

##### OPTION:

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.

### 4L.3 Warning Beacon

#### **SUPPORT:**

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 mid-block 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.

#### **STANDARD:**

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.

A Warning Beacon shall be used only to supplement an appropriate warning or regulatory sign or marker.

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 17 feet and a maximum of 19 feet.

#### **GUIDANCE:**

The condition or regulation justifying Warning Beacons should largely govern their location with respect to the roadway.

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.

Warning Beacons should be operated only during those periods or times when the condition or regulation exists.

#### **OPTION:**

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.

If Warning Beacons have more than one signal section, they may be flashed either alternately or simultaneously.

A flashing yellow beacon interconnected with a traffic signal controller assembly may be used with a traffic signal warning sign (see Section 2C.36).

### 4L.4 Speed Limit Sign Beacon

#### **STANDARD:**

A Speed Limit Sign Beacon shall be used only to supplement a Speed Limit sign.

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 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.

#### **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.

A Speed Limit Sign Beacon may be included within the border of a School Speed Limit (S5-1) sign (see Section 7B.15).

### 4L.5 Stop Beacon

#### **STANDARD:**

A Stop Beacon shall be used only to supplement a STOP sign, a DO NOT ENTER sign, or a WRONG WAY sign.

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. Vertically aligned signal indications used for a Stop Beacon shall not be used to supplement a STOP sign.

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.

Section 6F.41	BLASTING ZONE AHEAD Sign (W22-1) . . . . .	6F-18
6F.42	TURN OFF 2-WAY RADIO AND CELLULAR PHONE Sign (W22-2b) . . . . .	6F-18
6F.43	END BLASTING ZONE Sign (W22-3) . . . . .	6F-18
6F.44	Shouldert Signs . . . . .	6F-18
6F.44.1	SHOULDER DROP-OFF Sign (W8-9a) . . . . .	6F-19
6F.44.2	LOW SHOULDER Sign (W8-9), HIGH SHOULDER Sign (W21-X9) . . . . .	6F-19
6F.44.3	NO SHOULDER SIGN (W8-23) . . . . .	6F-19
6F.44.4	SOFT SHOULDER SIGN (W8-4) . . . . .	6F-19
6F.45	UNEVEN LANES Sign (W8-11) . . . . .	6F-19
6F.46	STEEL PLATE AHEAD Sign (W8-24) . . . . .	6F-19
6F.47	NO CENTER STRIPE Sign (W8-12a) . . . . .	6F-20
6F.48	Reverse Curve Signs (W1-4 Series) . . . . .	6F-20
6F.49	Double Reverse Curve Signs (W1-X1, W1-X1b) . . . . .	6F-20
6F.50	Other Warning Signs . . . . .	6F-20
6F.50.1	BUMP and DIP Signs (W8-1, W8-2) . . . . .	6F-22
6F.50.2	BE PREPARED TO STOP Sign (W3-4) . . . . .	6F-22
6F.51	Special Warning Signs . . . . .	6F-22
6F.52	Advisory Speed Plaque (W13-1P) . . . . .	6F-23
6F.53	Supplementary Distance Plaque (W7-3aP) . . . . .	6F-23
6F-54	Motorcycle Plaque (W8-15P) . . . . .	6F-23
6F.55	Guide Signs . . . . .	6F-23
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Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
Stop	R1-1	6F.6	30 x 30 *	---	---
Stop (on Stop/Slow Paddle)	R1-1	6E.3	18 x 18	---	---
Yield	R1-2	6F.6	36 x 36 x 36	48 x 48 x 48	30 x 30 x 30
To Oncoming Traffic	R1-2aP	6F.6	36 x 30	48 x 36	24 x 18
Speed Limit	R2-1	6F.12	24 x 30 *	36 x 48	---
Fines Higher (plaque)	R2-6P	6F.12	24 x 18	36 x 24	---
Fines Double (plaque)	R2-6aP	6F.12	24 x 18	36 x 24	---
\$XX Fine (plaque)	R2-6bP	6F.12	24 x 18	36 x 24	---
Begin Higher Fines Zone	R2-10	6F.12	24 x 30	36 x 48	---
End Higher Fines Zone	R2-11	6F.12	24 x 30	36 x 48	---
End Work Zone Speed Limit	R2-12	6F.12	24 x 36	36 x 54	---
Movement Prohibition	R3-1,2,3,4,18,27	6F.6	24 x 24 *	36 x 36	---
Mandatory Movement (1 lane)	R3-5	6F.6	30 x 36	---	---
Optional Movement (1 lane)	R3-6	6F.6	30 x 36	---	---
Right (Left) Lane Must Turn Right (Left)	R3-7	6F.6	30 x 30 *	---	---
Advance Intersection Lane Control	R3-30	6F.6	Varies x 30	---	---
Do Not Pass	R4-1	6F.6	24 x 30	36 x 48	---
Pass With Care	R4-2	6F.6	24 x 30	36 x 48	---
Keep Right	R4-7	6F.6	24 x 30	36 x 48	---
Narrow Keep Right	R4-7c	6F.6	18 x 30	---	---
Stay in Lane	R4-9	6F.11	24 x 30	36 x 48	---
Do Not Enter	R5-1	6F.6	30 x 30 *	36 x 36	---
Wrong Way	R5-1a	6F.6	36 x 24 *	42 x 30	---
One Way	R6-1	6F.6	36 x 12 *	54 x 18	---
One Way	R6-2	6F.6	24 x 30 *	36 x 48	---
No Parking (symbol)	R8-3	6F.6	24 x 24	36 x 36	---
Pedestrian Crosswalk	R9-8	6F.13	36 x 18	---	---
Sidewalk Closed	R9-9	6F.14	24 x 12	---	---
Sidewalk Closed, Use Other Side	R9-10	6F.14	24 x 12	---	---
Sidewalk Closed Ahead, Cross Here	R9-11	6F.14	24 x 18	---	---
Sidewalk Closed, Cross Here	R9-11a	6F.14	24 x 12	---	---
Wait on Stop/Go on Slow	R10-X1	6E.5	24 x 30	24 x 30	---
Road Closed	R11-2	6F.8	48 x 30	---	---
Road Closed, Local Traffic Only	R11-3a,3b,4	6F.9	60 x 30	---	---
Weight Limit	R12-1,2	6F.10	24 x 30	36 x 48	---
Weight Limit (with symbols)	R12-5	6F.10	24 x 36	36 x 48	---
Turn and Curve Signs	W1-1,2,3,4	6F.16	36 x 36	48 x 48	30 x 30
Reverse Curve (2 or more lanes)	W1-4b,4c	6F.48	36 x 36	48 x 48	30 x 30
One-Direction Large Arrow	W1-6	6F.16	48 x 24	60 x 30	---
Chevron Alignment	W1-8	6F.16	18 x 24	30 x 36	---
Stop Ahead	W3-1	6F.16	36 x 36	48 x 48	30 x 30
Yield Ahead	W3-2	6F.16	36 x 36	48 x 48	30 x 30
Signal Ahead	W3-3	6F.16	36 x 36	48 x 48	30 x 30
Be Prepared to Stop	W3-4	6F.16	36 x 36	48 x 48	30 x 30
Reduced Speed Ahead	W3-5	6F.16	36 x 36	48 x 48	30 x 30
XX MPH SpeedZone Ahead	W3-5b	6F.16	36 x 36	48 x 48	30 x 30
Traffic Control Change Ahead	W3-X5	6F.30	36 x 36	48 x 48	30 x 30

\* See Table 2B-1 for minimum size required for signs facing traffic on multi-lane conventional roads

- Notes: 1. Larger signs may be used wherever necessary for greater legibility or emphasis.  
2. Dimensions are shown in inches and are shown as width x height.

**Table 6F-1 Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 1 of 3)**

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
Merging traffic	W4-1,1a,5	6F.16	36 x 36	48 x 48	36 x 36
Lane Ends	W4-2	6F.24	36 x 36	48 x 48	30 x 30
Added Lane	W4-3,6	6F.16	36 x 36	48 x 48	30 x 30
No Merge Area (plaque)	W4-5P	6F.16	18 x 24	24 x 30	---
Road Narrows	W5-1	6F.16	36 x 36	48 x 48	30 x 30
Narrow Bridge	W5-2	6F.16	36 x 36	48 x 48	30 x 30
One Lane Bridge	W5-3	6F.16	36 x 36	48 x 48	30 x 30
Ramp Narrows	W5-4	6F.26	36 x 36	48 x 48	30 x 30
Divided Highway	W6-1	6F.16	36 x 36	48 x 48	30 x 30
Divided highway Ends	W6-2	6F.16	36 x 36	48 x 48	30 x 30
Two-Way Traffic	W6-3	6F.32	36 x 36	48 x 48	30 x 30
Two-Way Traffic	W6-4	6F.76	12 x 18	12 x 18	---
Hill (symbol)	W7-1	6F.16	36 x 36	48 x 48	30 x 30
Next XX Miles (plaque)	W7-3aP	6F.53	24 x 18	36 x 30	---
Bump	W8-1,1a	6F.16	36 x 36	48 x 48	30 x 30
Dip	W8-2	6F.16	36 x 36	48 x 48	30 x 30
Pavement Ends	W8-3	6F.16	36 x 36	48 x 48	30 x 30
Soft Shoulder	W8-4	6F.44	36 x 36	48 x 48	30 x 30
Slippery When Wet	W8-5	6F.16	36 x 36	48 x 48	30 x 30
Truck Crossing	W8-6	6F.36	36 x 36	48 x 48	30 x 30
Loose Gravel	W8-7	6F.16	36 x 36	48 x 48	30 x 30
Rough Road	W8-8	6F.16	36 x 36	48 x 48	30 x 30
Low Shoulder	W8-9	6F.44	36 x 36	48 x 48	30 x 30
Shoulder Drop-Off	W8-9a	6F.44.1	36 x 36	48 x 48	30 x 30
Uneven Lanes	W8-11	6F.45	36 x 36	48 x 48	30 x 30
No Center Stripe	W8-12a	6F.47	36 x 36	48 x 48	30 x 30
Fallen Rocks	W8-14	6F.16	36 x 36	48 x 48	30 x 30
Grooved Pavement	W8-15	6F.16	36 x 36	48 x 48	30 x 30
Motorcycle (plaque)	W8-15P	6F.54	24 x 18	30 x 24	---
Road May Flood	W8-18	6F.16	36 x 36	48 x 48	24 x 24
No Shoulder	W8-23	6F.44.3	36 x 36	48 x 48	30 x 30
Steel Plate Ahead	W8-24	6F.46	36 x 36	48 x 48	30 x 30
Shoulder Ends	W8-25	6F.16	36 x 36	48 x 48	30 x 30
Lane Ends	W9-1,2	6F.16	36 x 36	48 x 48	30 x 30
Grade Crossing Advance Warning	W10-1	6F.16	36 Diameter	---	---
Truck	W11-10	6F.36	36 x 36	48 x 48	30 x 30
Double Arrow	W12-1	6F.16	30 x 30	---	---
Low Clearance	W12-2	6F.16	36 x 36	48 x 48	30 x 30
Advisory Speed (plaque)	W13-1P	6F.52	24 x 24	30 x 30	18 x 18
On Ramp (plaque)	W13-4P	6F.25	36 x 36	36 x 36	---
No Passing Zone (pennant)	W14-3	6F.16	48 x 48 x 36	64 x 64 x 48	40 x 40 x 30
Emergency Scene Ahead	W14-X15	6I.1	36 x 36	48 x 48	---
XX Feet (plaque)	W16-2P	6F.16	24 x 18	30 x 24	---
Road Work Ahead	W20-1	6F.18	36 x 36	48 x 48	30 x 30
Detour Ahead	W20-2	6F.19	36 x 36	48 x 48	30 x 30
Road (Street) Closed Ahead	W20-3	6F.20	36 x 36	48 x 48	30 x 30
Trail Closed Ahead	W20-3a	6F.20.1	18 x 18	---	---

\* See Table 2B-1 for minimum size required for signs facing traffic on multi-lane conventional roads

- Notes: 1. Larger signs may be used wherever necessary for greater legibility or emphasis.  
2. Dimensions are shown in inches and are shown as width x height.

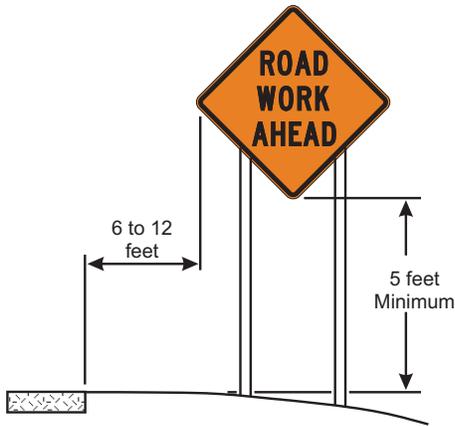
**Table 6F-1 Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 2 of 3)**

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
One Lane Road Ahead	W20-4	6F.21	36 x 36	48 x 48	30 x 30
Flagger (symbol)	W20-7	6F.31	36 x 36	48 x 48	30 x 30
Slow (on Stop/Slow Paddle)	W20-8	6E.3	18 x 18	---	---
Merge	W20-X3	6F.24.1	36 x 36	48 x 48	30 x 30
Bypass Ahead	W20-X6	6F.50	36 x 36	48 x 48	30 x 30
Narrow Lane (width shown)	W20-X11	6F.50	36 x 36	48 x 48	30 x 30
Right Two Lanes Closed	W20-X13	6F.22	36 x 36	48 x 48	30 x 30
Lanes Narrow	W20-X17	6F.50	36 x 36	48 x 48	30 x 30
Workers	W21-1	6F.33	36 x 36	48 x 48	30 x 30
Fresh Oil (Tar)	W21-2	6F.34	36 x 36	48 x 48	30 x 30
Road Machinery Ahead	W21-3	6F.35	36 x 36	48 x 48	30 x 30
Slow Moving Vehicle	W21-4	6G.6	36 x 18	---	---
Shoulder Work	W21-5	6F.37	36 x 36	48 x 48	30 x 30
Shoulder Closed	W21-5a	6F.37	36 x 36	48 x 48	30 x 30
Survey Crew	W21-6	6F.38	36 x 36	48 x 48	30 x 30
Survey Crew Ahead	W21-6a	6F.38	36 x 36	48 x 48	30 x 30
Utility Work Ahead	W21-7	6F.39	36 x 36	48 x 48	30 x 30
Mowing Ahead	W21-8	6G.6	36 x 36	48 x 48	30 x 30
Right (Left) Lane Closed	W21-X5	6F.22	36 x 36	48 x 48	30 x 30
Center Lane Closed	W21-X5c	6F.23	36 x 36	48 x 48	30 x 30
Crew Working Ahead	W21-X6	6F.38.1	36 x 36	48 x 48	30 x 30
High Shoulder	W21-X9	6F.44.2	36 x 36	48 x 48	30 x 30
Blasting Zone Ahead	W22-1	6F.41	36 x 36	48 x 48	30 x 30
Turn Off 2-Way Radio and Cell Phone	W22-2	6F.42	42 x 36	42 x 36	---
End Blasting Zone	W22-3	6F.43	42 x 36	42 x 36	36 x 30
Slow Traffic Ahead	W23-1	6F.27	48 x 24	48 x 24	---
New Traffic Pattern Ahead	W23-2	6F.30	36 x 36	48 x 48	30 x 30
Double Reverse Curve (1 lane)	W24-1	6F.49	36 x 36	48 x 48	30 x 30
Double Reverse Curve (2 lanes)	W24-1a	6F.49	36 x 36	48 x 48	30 x 30
Double Reverse Curve (3 lanes)	W24-1b	6F.49	36 x 36	48 x 48	30 x 30
All Lanes (plaque)	W24-1cP	6F.49	24 x 18	30 x 24	---
Road Work Next XX Miles	G20-1	6F.56	36 x 18	48 x 24	---
End Road Work	G20-2	6F.57	36 x 18	48 x 24	---
Pilot Car Follow Me	G20-4	6F.58	36 x 18	---	---
Work Zone (plaque)	G20-5aP	6F.12	24 x 18	36 x 24	---
Road Closed Beginning XXXX XX	G20-X1	6F.56.1	72 x 60	90 x 78	---
Exit Open	E5-2	6F.28	48 x 36	48 x 36	---
Exit Closed	E5-2a	6F.28	48 x 36	48 x 36	---
Exit Only	E5-3	6F.29	48 x 36	48 x 36	---
Detour	M4-8	6F.59	24 x 12	30 x 15	---
End Detour	M4-8a	6F.59	24 x 18	24 x 18	---
End	M4-8b	6F.59	24 x 12	24 x 12	---
Detour	M4-9	6F.59	30 x 24	48 x 36	---
Bike/Pedestrian	M4-9a	6F.59	30 x 24	---	---
Pedestrian Detour	M4-9b	6F.59	30 x 24	---	---
Bike Detour	M4-9c	6F.59	30 x 24	---	---
Detour	M4-10	6F.59	48 x 18	---	---

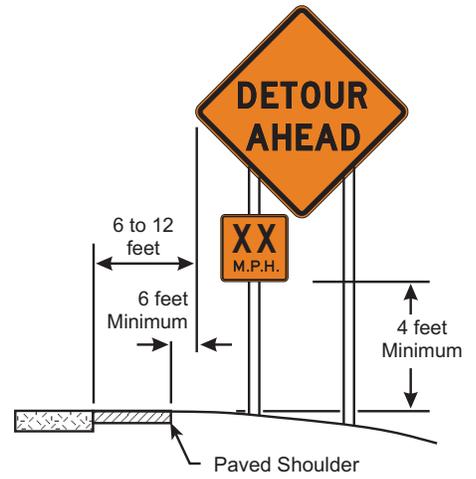
\* See Table 2B-1 for minimum size required for signs facing traffic on multi-lane conventional roads

- Notes: 1. Larger signs may be used wherever necessary for greater legibility or emphasis.  
2. Dimensions are shown in inches and are shown as width x height.

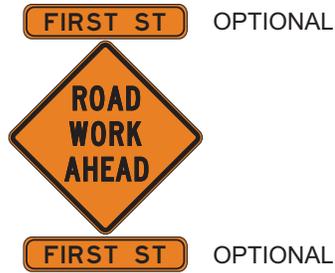
**Table 6F-1 Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 3 of 3)**



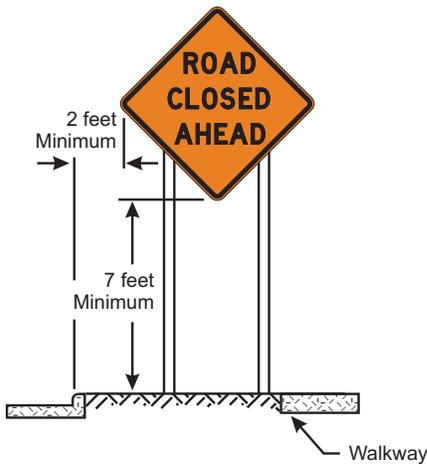
A. RURAL AREA



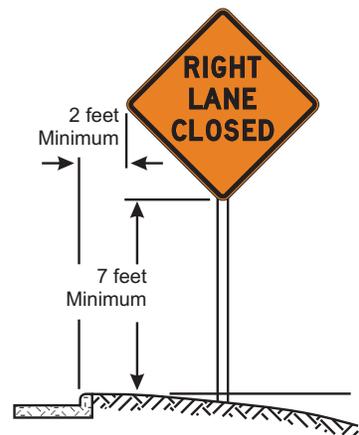
B. RURAL AREA WITH ADVISORY SPEED PLATE



Advance street name plaques or route markers may be installed above or below warning signs



C. BUSINESS, COMMERCIAL, OR RESIDENTIAL AREA



D. BUSINESS, COMMERCIAL, OR RESIDENTIAL AREA (WITHOUT CURB)

Figure 6F-1 Height and Lateral Location of Signs - Typical Installations

**6F.18 ROAD (STREET) WORK AHEAD Sign (W20-1)**



W20-1

**GUIDANCE:**

The ROAD (STREET) WORK AHEAD (W20-1) sign, which serves as a general warning of obstructions or restrictions, should be located in advance of the work space or any detour, on the road where the work is taking place, and on all intersecting roadways.

Where traffic can enter a TTC zone from a crossroad or a major (high-volume) driveway, an advance warning sign should be used on the crossroad or major driveway.

**STANDARD:**

The ROAD (STREET) WORK (W20-1) sign shall have the legend ROAD (STREET) WORK, XX FT, XX MILES, or AHEAD.

**6F.19 DETOUR AHEAD Sign (W20-2)**



W20-2

**GUIDANCE:**

The DETOUR AHEAD (W20-2) sign should be used in advance of a road user detour over a different roadway or route.

**STANDARD:**

The DETOUR sign shall have the legend DETOUR, XX FEET, XX MILES, or AHEAD.

**6F.20 ROAD (STREET) CLOSED AHEAD Sign (W20-3)**

**GUIDANCE:**

The ROAD (STREET) CLOSED AHEAD (W20-3) sign should be used in advance of the point where a highway is closed to all road users, or to all but local road users.

**STANDARD:**

The ROAD (STREET) CLOSED sign shall have the legend ROAD (STREET) CLOSED, XX FEET, XX MILES, or AHEAD.



W20-3



W20-3a

**6F.20.1 TRAIL CLOSED AHEAD Sign (W20-3a)**

**GUIDANCE:**

The TRAIL CLOSED AHEAD (W20-3a) sign should be used in advance of the point where a recreational trail is closed to all users.

**6F.21 ONE LANE ROAD AHEAD Sign (W20-4)**



W20-4

**STANDARD:**

The ONE LANE ROAD AHEAD (W20-4) sign shall be used only in advance of that point where motor vehicle traffic in both directions must use a common single lane (see Section 6C.10). It shall have the legend ONE LANE ROAD, XX FEET, XX MILES, or AHEAD.

**GUIDANCE:**

If the affected one lane roadway is not visible from one end to the other, or if the traffic is such that simultaneous arrivals at both ends occur frequently, flagging procedures, stop sign or signal control should be used to control alternate traffic flows.

**6F.22 Lane(s) Closed Signs  
(W21-X5, W20-X13)**



**STANDARD:**

Lane closed signs shall be used in advance of that point where one or more through lanes of a multiple-lane roadway are closed.

For a single lane closure, the RIGHT (LEFT) LANE CLOSED (W21-X5) sign shall be used. Where two adjacent lanes are closed, the RIGHT (LEFT) TWO LANES CLOSED (W20-X13) shall be used.

**6F.23 CENTER LANE CLOSED Sign  
(W21-X5c)**

**GUIDANCE:**

The CENTER LANE CLOSED (W21-X5c) sign should be used in advance of that point where work occupies the center lane(s) and approaching motor vehicle traffic is directed to the right or left of the work zone in the center lane.



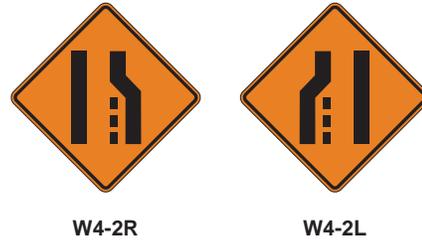
**6F.23.1 THRU TRAFFIC MERGE  
RIGHT (LEFT) Sign (W4-1a)**

**GUIDANCE:**

The THRU TRAFFIC MERGE RIGHT (LEFT) (W4-1a) sign should be used in advance of an intersection where one or more lane closures on the far side of a multi-lane intersection require through motor vehicle traffic on the approach to the intersection to use the right (left) lane to proceed through the intersection.

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**6F.24 Lane Ends Sign (W4-2)**



**OPTION:**

The Lane Reduction (W4-2) symbol sign may be used to warn drivers of the reduction in the number of motor vehicle traffic lanes in the direction of travel on a multi-lane roadway.

**6F.24.1 MERGE Sign (W20-X3)**



**GUIDANCE:**

The MERGE sign (W20-X3) with a demountable arrow should be used when closing one or more lanes of a multi-lane roadway.

**OPTION:**

The MERGE sign (W20-X3) may be used in conjunction with the LANE REDUCTION Sign (W4-2).

**6F.25 ON RAMP Plaque (W13-4P)**



**OPTION:**

When work is being done on a ramp, but the ramp remains open, the ON RAMP (W13-4) plaque may be used to supplement the advance ROAD WORK sign.

**6F.36 Motorized Traffic Signs  
(W8-6, W11-10)**



W8-6



W11-10

**OPTION:**

Motorized Traffic (W8-6, W11-10) signs may be used to alert road users to locations where unexpected travel on the roadway or entries into or departures from the roadway by construction vehicles might occur. The TRUCK CROSSING (W8-6) word message sign may be used as an alternate to the Truck Crossing symbol (W11-10) sign where there is an established construction vehicle crossing of the roadway.

**SUPPORT:**

These locations might be relatively confined or might occur randomly over a segment of roadway.

**6F.37 SHOULDER WORK Signs  
(W21-5, W21-5a)**



W21-5



W21-5a

**SUPPORT:**

Shoulder Work signs warn of maintenance, reconstruction, or utility operations on the highway shoulder where the roadway is unobstructed.

**STANDARD:**

The Shoulder Work sign shall have the legend SHOULDER WORK (W21-5), RIGHT (LEFT) SHOULDER CLOSED (W21-5a), or RIGHT (LEFT) SHOULDER CLOSED XXX FT or AHEAD (W21-5b).

**OPTION:**

The Shoulder Work sign may be used in advance of the point on a nonlimited access highway where there is shoulder work. The Shoulder Work sign may be used singly or in combination with a ROAD WORK NEXT X MILES or ROAD WORK AHEAD sign.

**GUIDANCE:**

On freeways and expressways, the RIGHT (LEFT) SHOULDER CLOSED XXX FT or AHEAD (W21-5b) sign followed by RIGHT (LEFT) SHOULDER CLOSED (W21-5a) sign should be used in advance of the point where the shoulder work occurs and should be preceded by a ROAD WORK AHEAD sign.

**6F.38 SURVEY CREW Sign  
(W21-6, W21-6a)**



W21-6



W21-6a

**GUIDANCE:**

The SURVEY CREW (W21-6) or the SURVEY CREW AHEAD (W21-6a) sign should be used to warn of surveying crews working in or adjacent to the roadway.

**6F.38.1 CREW WORKING AHEAD Sign  
(W21-X6)**



W21-X6

**GUIDANCE:**

The CREW WORKING AHEAD (W21-X6) sign should be used for short duration activities being done on or off the roadway for such things as filming, surveying, tree trimming, road inspection, lighting, signal work, utility work, and other activities where a crew is visible to traffic.

**OPTION:**

The CREW WORKING AHEAD (W21-X6) sign may be used in place of the SURVEY CREW (W21-6) sign or the SURVEY CREW AHEAD (W21-6a) sign.

### 6F.39 UTILITY WORK AHEAD Sign (W21-7)



W21-7

#### OPTION:

The UTILITY WORK (W21-7) sign may be used as an alternate to the ROAD (STREET) WORK (W20-1) sign for utility operations on or adjacent to a highway.

#### SUPPORT:

Typical examples of where the UTILITY WORK sign is used appear in Chapter 6K (*the Field Manual*), Layouts 6K-3, 6K-9, 6K-13, 6K-22, 6K-28, 6K-40, and 6K-51.

#### STANDARD:

The UTILITY WORK sign shall carry the legend UTILITY WORK, XX FT, XX MILES, or AHEAD.

### 6F.40 Signs for Blasting Areas

#### SUPPORT:

Radio-Frequency (RF) energy can cause the premature firing of electric detonators (blasting caps) used in TTC zones.

#### STANDARD:

Road users shall be warned to turn off mobile radio transmitters and cellular telephones where blasting operations occur. A sequence of signs shall be prominently displayed to direct operators of mobile radio equipment, including cellular telephones, to turn off transmitters in a blasting area. These signs shall be covered or removed when there are no explosives in the area or the area is otherwise secured.

### 6F.41 BLASTING ZONE AHEAD Sign (W22-1)



W22-1

#### STANDARD:

The BLASTING ZONE AHEAD (W22-1) sign shall be used in advance of any TTC zone where explosives are being used. The TURN OFF 2-WAY RADIO AND CELL PHONE and END BLASTING ZONE signs shall be used in sequence with this sign.

### 6F.42 TURN OFF 2-WAY RADIO AND CELLULAR PHONE Sign (W22-2)

The TURN OFF 2-WAY RADIO AND CELLULAR PHONE (W22-2) sign shall follow the BLASTING ZONE AHEAD sign and shall be placed at least 1,000 feet before the beginning of the blasting zone.



W22-2



W22-3

### 6F.43 END BLASTING ZONE Sign (W22-3)

#### STANDARD:

The END BLASTING ZONE (W22-3) sign shall be placed a minimum of 1,000 feet past the blasting zone.

#### OPTION:

The END BLASTING ZONE sign may be placed either with or preceding the END ROAD WORK sign.

### 6F.44 Shoulder Signs

#### SUPPORT:

The signs in the following sections are to be used as described.

### 6F.44.1 SHOULDER DROP OFF Sign (W8-9a)



W8-9a

#### STANDARD:

The SHOULDER DROP-OFF (W8-9a) sign shall be used when a shoulder drop-off, adjacent to the travel lane, exceeds 2 inches in depth and is not protected by portable barriers and the LOW SHOULDER sign (W8-9) is not used.

### 6F.44.2 LOW SHOULDER Sign (W8-9) HIGH SHOULDER (W21-X9)



W8-9



W21-X9

#### STANDARD:

The LOW SHOULDER sign (W8-9) and the HIGH SHOULDER sign (W21-X9) shall be used for a shoulder drop-off or rise in accordance with the guidelines shown in Figure 6K-3 on page 6K-xxi.

### 6F.44.3 NO SHOULDER Sign (W8-23)



W8-23

#### STANDARD:

The NO SHOULDER sign (W8-23) shall be used for a shoulder drop-off in accordance with the guidelines shown in Figure 6K-4 and 6K-5 on pages 6K-xxii and 6K-xxiii.

### 6F.44.4 SOFT SHOULDER Sign (W8-4)

#### OPTION:

The SOFT SHOULDER sign (W8-4) may be used for a shoulder drop-off between 2 and 4 inches in height and the edge has been tapered and compacted at a rate of 6:1 so that a vehicle may safely drive on it.



W8-4



W8-11

### 6F.45 UNEVEN LANES Sign (W8-11)

#### STANDARD:

The UNEVEN LANES (W8-11) sign shall be used in accordance with the guidelines shown in Figure 6-3 on page xxi.

#### GUIDANCE:

The UNEVEN LANES (W8-11) sign should be used during operations that create a difference in elevation between adjacent lanes that are open to travel.

### 6F.46 STEEL PLATE AHEAD Sign (W8-24)



W8-24

#### OPTION:

A STEEL PLATE AHEAD (W8-24) sign may be used to warn road users that the presence of a temporary steel plate(s) might make the road surface uneven and might create slippery conditions during wet weather.

### 6F.47 NO CENTER STRIPE Sign (W8-12a)



W8-12a

**STANDARD:**

The NO CENTER STRIPE (W8-12a) sign shall be used as detailed in Section 6F.78.

**GUIDANCE:**

This sign should also be used at major connection, traffic generators, and/or at appropriate intervals to advise motorists entering the zone.

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### 6F.48 Reverse Curve Signs (W1-4 Series)



W1-4



W1-4b



W1-4c

**GUIDANCE:**

In order to give road users advance notice of a lane shift, a Reverse Curve (W1-4, W1-4b, or W1-4c) sign (see Figure 6F-4) should be used when a lane (or lanes) is being shifted to the left or right. If the design speed of the curves is 30 mph or less, a Reverse Turn (W1-3) sign should be used.

**STANDARD:**

If a Reverse Curve (or Turn) sign is used, the direction of the reverse curve (or turn) symbol shall be consistent with the desired vehicle path. Except as provided in the following Option, the number of lanes illustrated on the sign shall be the same as the number of through lanes available to road users.

**OPTION:**

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.

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

### 6F.49 Double Reverse Curve Signs (W24-1 series)



W24-1



W24-1a



W24-1b

**OPTION:**

The Double Reverse Curve (W24-1, W24-1a, W24-1b) sign may be used where the tangent distance between two reverse curves is less than 600 feet, thus making it difficult for a second Reverse Curve (W1-4 series) sign to be placed between the curves. If the design speed of the curves is 30 mph or less, Double Reverse Turn signs should be used.

**STANDARD:**

If a Double Reverse Curve (or Turn) sign is used, the direction of the double reverse curve (or turn) symbol shall be consistent with the desired vehicle path. Except as provided in the first paragraph of the following Option, the number of lanes illustrated on the sign shall be the same as the number of through lanes available to road users.

**OPTION:**

Where two or more lanes are being shifted, a W24-1 (or Double Reverse Turn sign showing one lane) sign with an ALL LANES (W24-1cP) plaque may be used instead of a sign that illustrates the number of lanes.

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

### 6F.50 Other Warning Signs

**OPTION:**

Advance warning signs may be used by themselves or with other advance warning signs.

Besides the warning signs specifically related to TTC zones, several other warning signs in Part 2 may apply in TTC zones.

**STANDARD:**

Except as provided in Section 6F.02, other warning signs that are used in TTC zones shall have black legends and borders on an orange background.

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## 6F.71 Longitudinal Channelizing Barricades

### SUPPORT:

Longitudinal channelizing devices are lightweight, deformable devices that are highly visible, have good target value, and can be connected together.

### STANDARD:

If used singly as Type 1, 2, or 3 barricades, longitudinal channelizing devices shall comply with the general size, color, stripe pattern, retroreflectivity, and placement characteristics established for the devices described in this Chapter.

### GUIDANCE:

If used to channelize vehicular traffic at night, longitudinal channelizing devices should be supplemented with retroreflective material or delineation for improved nighttime visibility.

### OPTION:

Longitudinal channelizing barricades may be used instead of a line of cones, drums, or barricades.

Longitudinal channelizing barricades may be hollow and filled with water as a ballast.

Longitudinal channelizing devices may be used for pedestrian traffic control.

### STANDARD:

If used for pedestrian traffic control, longitudinal channelizing devices shall be interlocked to delineate or channelize flow. The interlocking devices shall not have gaps that allow pedestrians to stray from the channelizing path.

### GUIDANCE:

Longitudinal channelizing devices have not met the crashworthy requirements for temporary traffic barriers and should not be used to shield obstacles or provide positive protection for pedestrians or workers.

## 6F.72 Temporary Lane Separators

### OPTION:

Temporary lane separators may be used to channelize road users, to divide opposing vehicular traffic lanes, to divide lanes when two or more lanes are open in the same direction, and to provide continuous pedestrian channelization.

### STANDARD:

Temporary lane separators shall be crashworthy. Temporary lane separators shall have a maximum height of 4 inches and a maximum width of 1 foot, and shall have sloping sides in order to facilitate crossover by emergency vehicles.

### OPTION:

Temporary lane separators may be supplemented with any of the approved channelizing devices contained in this Chapter, such as tubular markers, vertical panels, and opposing traffic lane dividers.

### STANDARD:

If appropriate channelizing devices are used to supplement a temporary lane separator, the channelizing devices shall be retroreflectORIZED to provide nighttime visibility. If channelizing devices are not used, the temporary lane separator shall contain retroreflectORIZATION to enhance its visibility.

### GUIDANCE:

A temporary lane separator should be stabilized by affixing it to the pavement in a manner suitable to its design, while allowing the unit to be shifted from place to place within the TTC zone in order to accommodate changing conditions.

### STANDARD:

At pedestrian crossing locations, temporary lane separators shall have an opening or be shortened to provide a pathway that is at least 60 inches wide for crossing pedestrians.

## 6F.73 Other Channelizing Devices

### OPTION:

Channelizing devices other than those described in this Chapter may be used in special situations based on an engineering study.

### GUIDANCE:

Other channelizing devices should conform to the general size, color, stripe pattern, retroreflection, and placement characteristics established for the devices described in this Chapter.

## 6F.74 Detectable Edging for Pedestrians

### SUPPORT:

Individual channelizing devices, tape or rope used to connect individual devices, other discontinuous barriers and devices, and pavement markings are not detectable by persons with visual disabilities and are incapable of providing detectable path guidance on temporary or realigned sidewalks or other pedestrian facilities.

### GUIDANCE:

When it is determined that a facility should be accessible to and detectable by pedestrians with visual disabilities, a continuously detectable edging should be provided throughout the length of the facility such that it can be followed by pedestrians using long canes for guidance. This edging should protrude at least 6 inches above the surface of

the sidewalk or pathway, with the bottom of the edging a maximum of 2 inches above the surface. This edging should be continuous throughout the length of the facility except for gaps at locations where pedestrians or vehicles will be turning or crossing. This edging should consist of a prefabricated or formed-in-place curbing or other continuous device that is placed along the edge of the sidewalk or walkway. This edging should be firmly attached to the ground or to other devices. Adjacent sections of this edging should be interconnected such that the edging is not displaced by pedestrian or vehicular traffic or work operations, and such that it does not constitute a hazard to pedestrians, workers, or other road users.

**SUPPORT:**

Examples of detectable edging for pedestrians include:

- A. Prefabricated lightweight sections of plastic, metal, or other suitable materials that are interconnected and fixed in place to form a continuous edge.
- B. Prefabricated lightweight sections of plastic, metal, or other suitable materials that are interconnected, fixed in place, and placed at ground level to provide a continuous connection between channelizing devices located at intervals along the edge of the sidewalk or walkway.
- C. Sections of lumber interconnected and fixed in place to form a continuous edge.
- D. Formed-in-place asphalt or concrete curb.
- E. Prefabricated concrete curb sections that are interconnected and fixed in place to form a continuous edge.
- F. Continuous temporary traffic barrier or longitudinal channelizing barricades placed along the edge of the sidewalk or walkway that provides a pedestrian edging at ground level.
- G. Chain link or other fencing equipped with a continuous bottom rail.

**GUIDANCE:**

Detectable pedestrian edging should be orange, white, or yellow and should match the color of the adjacent channelizing devices or traffic control devices, if any are present.

**6F.74.1 Temporary Walkway Surface**

**SUPPORT:**

There are areas of a work zone where an accessible pedestrian pathway will cross short segments of rough, soft or uneven ground or hazards. In addition, work vehicles might need to cross an accessible pedestrian pathway.

**GUIDANCE:**

As stated in 6D.1, a smooth, continuous hard surface should be provided throughout the entire length of a temporary pedestrian pathway.

A temporary walkway surface should be used to facilitate pedestrian movement through:

- A. Short segments of rough, soft or uneven ground surfaces; and
- B. segments where vehicles may cross the temporary pedestrian pathway and a detectable edge is not feasible, such as work vehicle access points.

**OPTION:**

If clear direction is not given for a temporary crosswalk by the grade break of the curb ramp (temporary or permanent), a temporary walkway surface may be provided to guide pedestrians along the temporary crosswalk to the receiving curb ramp or intended destination.

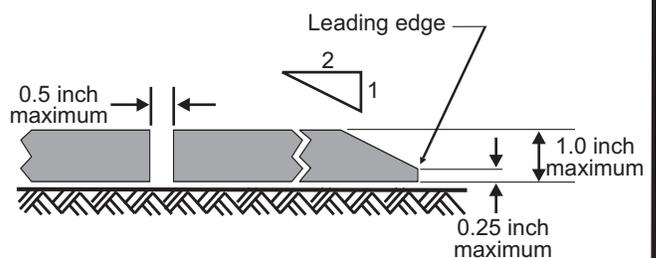
**STANDARD:**

The temporary walkway surface shall be firm, stable and slip resistant. The width of the temporary walkway surface shall be a minimum of 4 feet. Lateral joints between segments of the walkway surface shall be less than 0.5 inches.

If detectable edges (6F.74) are not used on a temporary walkway surface, the edges shall be marked with a contrasting 2- to 4-inch wide marking.

**GUIDANCE:**

Changes between the segments of the walkway surface should not exceed 0.5 inches. The side edges of the walkway surface should be between 0.25 inches and 1.0 inches thick. The leading and departing edges of the temporary walkway surface should follow the dimensions shown in Figure 6F-10 Temporary Walkway Surface Dimension.



Leading and departing edges are the same

**Figure 6F-10 Temporary Walkway Surface Dimensions**

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## 6F.75 Temporary Raised Islands

### STANDARD:

Temporary raised islands shall be used only in combination with pavement striping and other suitable channelizing devices.

### OPTION:

A temporary raised island may be used to separate vehicular traffic flows in two-lane, two-way operations on roadways having a vehicular traffic volume range of 4,000 to 15,000 average daily traffic (ADT) and on freeways having a vehicular traffic volume range of 22,000 ADT to 60,000 ADT.

Temporary raised islands also may be used in other than two-lane, two-way operations where physical separation of vehicular traffic from the TTC zone is not required.

### GUIDANCE:

Temporary raised islands should have the basic dimensions of 4 inches high by 12 inches wide and have rounded or chamfered corners.

The temporary raised islands should not be designed in such a manner that they would cause a driver to lose control of the vehicle if the vehicle inadvertently strikes the temporary raised island. If struck, pieces of the island should not be dislodged to the extent that they could penetrate the occupant compartment or involve other vehicles.

### STANDARD:

At pedestrian crossing locations, temporary raised islands shall have an opening or be shortened to provide at least a 60 inch wide pathway for the crossing pedestrian.

## 6F.76 Opposing Traffic Lane Divider and sign (W6-4)



W6-4

### SUPPORT:

Opposing traffic lane dividers are delineation devices used as center lane dividers to separate opposing vehicular traffic on a two-lane, two-way operation.

### STANDARD:

Opposing traffic lane dividers shall not be placed across pedestrian crossings.

The Opposing Traffic Lane Divider (W6-4) sign (see Figure 6F-4) shall be an upright, retroreflective orange-colored sign placed on a flexible support and sized at least 12 inches wide by 18 inches high.

## 6F.77 Pavement Markings

### SUPPORT:

Pavement markings are installed or existing markings are maintained or enhanced in TTC zones to provide road users with a clearly defined path for travel through the TTC zone in day, night, and twilight periods under both wet and dry pavement conditions.

### GUIDANCE:

The work should be planned and staged to provide for the placement and removal of the pavement markings in a way that minimizes the disruption to traffic flow approaching and through the TTC zone during the placement and removal process.

### STANDARD:

Existing pavement markings shall be maintained in all long-term stationary (see Section 6G.2) TTC zones in accordance with Chapters 3A and 3B, except as otherwise provided for temporary pavement markings in Section 6F.78. Pavement markings shall match the alignment of the markings in place at both ends of the TTC zone. Pavement markings shall be placed along the entire length of any paved detour or temporary roadway prior to the detour or roadway being opened to road users.

For long-term stationary operations, pavement markings in the temporary traveled way that are no longer applicable shall be removed or obliterated as soon as practical. Pavement marking obliteration shall remove the non-applicable pavement marking material, and the obliteration method shall minimize pavement scarring. Painting over existing pavement markings with black paint or spraying with asphalt shall not be accepted as a substitute for removal or obliteration.

### OPTION:

Removable, non-reflective, preformed tape that is approximately the same color as the pavement surface may be used where markings need to be covered temporarily.

## 6F.78 Interim Pavement Markings

### SUPPORT:

Interim pavement markings are those that are allowed to remain in place until the earliest date when it is practical and possible to install pavement markings that meet the Part 3 standards for pavement markings.

### GUIDANCE:

Interim pavement markings should not be in place for more than 14 calendar days unless justified by an engineering study.

White lane lines and yellow centerlines, including no passing zones should be installed before opening the roadway to traffic. If it is not possible or practical to install these markings before opening the roadway to traffic the interim markings should be installed at the end of each working day or provided by signing in accordance with the provisions of this section.

### GUIDANCE:

The temporary use of edge lines, channelizing lines, lane reduction transitions, gore markings, and other longitudinal markings, and the various non-longitudinal markings (such as stop lines, railroad crossings, crosswalks, words or symbols) should be in accordance with the State's or highway agency's policy.

### STANDARD:

Warning signs, channelizing devices, and delineation shall be used to indicate required road user paths in TTC zones where it is not possible to provide a clear path by pavement markings.

Except as otherwise provided in this Section, all interim pavement markings for no-passing zones shall comply with the requirements of Chapters 3A and 3B. All interim broken-line pavement markings shall use the same cycle length as permanent markings and shall have line segments that are at least 2 feet long.

### GUIDANCE:

All pavement markings and devices used to delineate road user paths should be reviewed during daytime and nighttime periods.

### OPTION:

Half-cycle lengths with a minimum of 2-foot stripes may be used on roadways with severe curvature (see Section 3A.6) for broken line center lines in passing zones and for lane lines.

For temporary situations of 14 calendar days or less, for a two- or three-lane road, no-passing zones may be identified by using DO NOT PASS (R4-1), PASS WITH CARE (R4-2), and NO PASSING ZONE (W14-3) signs (see Sections 2B.28, 2B.29, and 2C.45) rather than pavement markings. Also, DO NOT PASS, PASS WITH CARE, and NO PASSING ZONE signs may be used instead of pavement markings on roads with low volumes for longer periods in accordance with the State's or highway agency's policy.

### GUIDANCE:

If used, the DO NOT PASS, PASS WITH CARE, and NO PASSING ZONE signs should be placed in accordance with Sections 2B.28, 2B.29, and 2C.45.

If used, the NO CENTER STRIPE sign should be placed in accordance with Section 6F.47.

### OPTION:

On low volume roads with an ADT (Average Daily Traffic) of less than 400 vehicles, the signs may be used in lieu of pavement markings for up to 14 calendar days (see Section 5A.1).

### STANDARD:

If no passing zone signing is used in lieu of pavement markings the following shall be installed before opening the roadway to traffic:

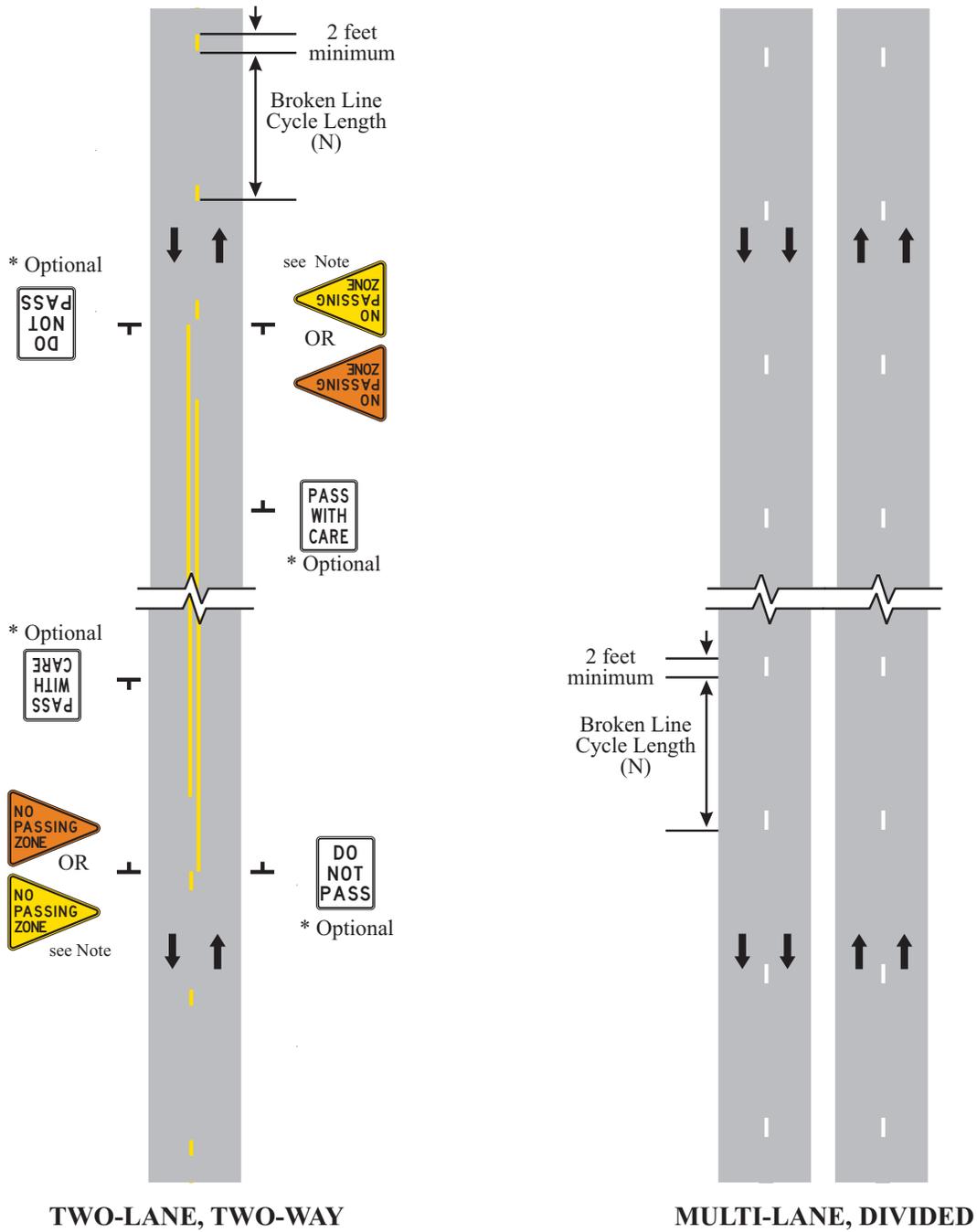
- If no interim markings are used a NO CENTER STRIPE sign (W8-12a) shall be used for each direction of travel in accordance with Section 6F.47. This sign shall be repeated at major intersections or on one-mile intervals, whichever is greater.
- If interim no passing zone markings are not installed but interim broken markings are installed a NO CENTER STRIPE sign (W8-12a) shall be installed in advance of each no passing zone.
- If not already in place, a DO NOT PASS sign (R4-1) shall be installed on the right side of the road at the beginning of the zone opposite of the NO PASSING ZONE sign (W14-3).
- A PASS WITH CARE sign (R4-2) shall be installed on the right side of the road at the end of the no passing zone.

## 6F.79 Temporary Raised Pavement Markers

### OPTION:

Retroreflective or internally illuminated raised pavement markers, or non-retroreflective raised pavement markers supplemented by retroreflective or internally illuminated markers, may be substituted for markings of other types in TTC zones.





NOTE:  
 Any NO PASSING ZONE sign (W14-3), used in a temporary traffic control zone that is applicable in its current location or will remain in place after completion of the construction project may have a black legend and border on a yellow retroreflective background.

**Figure 6F-8b Interim Pavement Markings - 14 Days or Less**

**STANDARD:**

If used, the color and pattern of the raised pavement markers shall simulate the color and pattern of the markings for which they substitute.

If temporary raised pavement markers are used to substitute for broken line segments, a group of at least three retroreflective markers shall be equally spaced at no greater than N/10 (see Section 3B.14). The value of N for a broken or dotted line shall equal the length of one line segment plus one gap.

If temporary raised pavement markers are used to substitute for solid lines, the markers shall be equally spaced at no greater than N/5, with retroreflective or internally illuminated units at a spacing no greater than N/2. The value of N referenced for solid lines shall equal the N for the broken or dotted lines that might be adjacent to or might extend the solid lines (see Section 3B.11).

**OPTION:**

Temporary raised pavement markers may be used to substitute for broken line segments by using at least two retroreflective markers placed at each end of a segment of 2 to 5 feet in length, using the same cycle length as permanent markings.

**GUIDANCE:**

Temporary raised pavement markers used on 2- to 5-foot segments to substitute for broken line segments should not be in place for more than 14 days unless justified by engineering judgment.

Raised pavement markers should be considered for use along surfaced diversions (bypasses) or temporary roadways, and other changed or new travel-lane alignments, because of the need to accentuate changed travel paths and their wet weather capabilities.

**OPTION:**

Retroreflective or internally illuminated raised pavement markers, or non-retroreflective raised pavement markers supplemented by retroreflective or internally illuminated markers, may also be used in TTC zones to supplement markings as prescribed in Chapters 3A and 3B.

**6F.80 Post-Mounted Delineators**

**STANDARD:**

When used, post-mounted delineators shall combine with or supplement other TTC devices. They shall be mounted on crashworthy supports so that the reflecting unit is approximately 4 feet above the near roadway edge. The standard

color for post-mounted delineators used along both sides of two-way streets and highways and the right side of one-way roadways shall be white. Post-mounted delineators used along the left side of one-way roadways shall be yellow.

**GUIDANCE:**

Spacing along roadway curves should be as set forth in Section 3F.4 and should be such that several delineators are always visible to the driver.

**OPTION:**

Post-mounted delineators may be used in TTC zones to indicate the alignment of the roadway and to outline the required vehicle path through the TTC zone.

**6F.81 Lighting Devices**

**GUIDANCE:**

Lighting devices should be provided in TTC zones based on engineering judgment.

When used to supplement channelization, the maximum spacing for warning lights should be identical to the channelizing device spacing requirements.

**OPTION:**

Lighting devices may be used to supplement retroreflectorized signs, barriers, and channelizing devices.

During normal daytime maintenance operations, the functions of flashing warning beacons may be provided by high-intensity rotating, flashing, oscillating, or strobe lights on a maintenance vehicle.

**STANDARD:**

Although vehicle hazard warning lights are permitted to be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights, they shall not be used instead of high-intensity rotating, flashing, oscillating, or strobe lights.

**6F.82 Floodlights**

**SUPPORT:**

Utility, maintenance, or construction activities on highways are frequently conducted during nighttime periods when motor vehicle traffic volumes are lower. Large construction projects are sometimes operated on a double-shift basis requiring night work.

**GUIDANCE:**

When nighttime work is being performed, floodlights should be used to illuminate the work area, flagger stations, equipment crossings, and other areas.

**STANDARD:**

Except in emergency situations, flagger stations shall be illuminated at night.

Floodlighting shall not produce a disabling glare condition for approaching road users, flaggers, or workers.

**GUIDANCE:**

The adequacy of the floodlight placement and elimination of potential glare should be determined by driving through and observing the floodlighted area from each direction on all approaching roadways after the initial floodlight setup, at night, and periodically.

**SUPPORT:**

Desired illumination levels vary depending upon the nature of the task involved. An average horizontal luminance of 5 foot candles can be adequate for general activities. Tasks requiring high levels of precision and extreme care can require an average horizontal luminance of 20 foot candles.

**6F.83 Warning Lights****SUPPORT:**

Type A, Type B, Type C, and Type D 360-degree warning lights are portable, powered, yellow, lens-directed, enclosed lights.

**STANDARD:**

Warning lights shall be in accordance with the current ITE "Purchase Specification for Flashing and Steady-Burn Warning Lights" (see Section 1A.11).

When warning lights are used, they shall be mounted on signs or channelizing devices in a manner that, if hit by an errant vehicle, they will not be likely to penetrate the windshield.

**GUIDANCE:**

The maximum spacing for warning lights should be identical to the channelizing device spacing requirements.

**SUPPORT:**

The light weight and portability of warning lights are advantages that make these devices useful as supplements to the retroreflectorization on signs and channelizing devices. The flashing lights are effective in attracting road users' attention.

**OPTION:**

Warning lights may be used in either a steady-burn or flashing mode.

**STANDARD:**

Except for the sequential flashing warning lights that are described in Paragraphs 8 and 9, flashing warning lights shall not be used for delineation, as a series of flashers fails to identify the desired vehicle path.

**OPTION:**

A series of sequential flashing warning lights may be placed on channelizing devices that form a merging taper in order to increase driver detection and recognition of the merging taper.

**STANDARD:**

If a series of sequential flashing warning lights is used, the successive flashing of the lights shall occur from the upstream end of the merging taper to the downstream end of the merging taper in order to identify the desired vehicle path. Each flashing warning light in the sequence shall be flashed at a rate of not less than 55 or more than 75 times per minute.

Type A Low-Intensity Flashing warning lights, Type C Steady-Burn warning lights, and Type D 360-degree Steady-Burn warning lights shall be maintained so as to be capable of being visible on a clear night from a distance of 3,000 feet. Type B High-Intensity Flashing warning lights shall be maintained so as to be capable of being visible on a sunny day when viewed without the sun directly on or behind the device from a distance of 1,000 feet.

Warning lights shall have a minimum mounting height of 30 inches to the bottom of the lens.

**SUPPORT:**

Type A Low-Intensity Flashing warning lights are used to warn road users during nighttime hours that they are approaching or proceeding in a potentially hazardous area.

**OPTION:**

Type A warning lights may be mounted on channelizing devices.

**SUPPORT:**

Type B High-Intensity Flashing warning lights are used to warn road users during both daylight and nighttime hours that they are approaching a potentially hazardous area.

**OPTION:**

Type B warning lights are designed to operate 24 hours per day and may be mounted on advance warning signs or on independent supports.

Type C Steady-Burn warning lights and Type D 360-degree Steady-Burn warning lights may be used during nighttime hours to delineate the edge of the traveled way.

**GUIDANCE:**

When used to delineate a curve, Type C and Type D 360-degree warning lights should only be used on devices on the outside of the curve, and not on the inside of the curve.

**6F.83.1 Warning Lights on STOP Signs****SUPPORT:**

Type A warning lights are portable, powered, red, lens-directed, enclosed lights.

**STANDARD:**

Warning lights shall be in accordance with the current ITE "Purchase Specification for Flashing and Steady-Burn Warning Lights" except except that they shall be red in color.

Warning lights shall flash when placed on STOP signs.

The warning lights shall be maintained according to the Type A Low-Intensity Flashing warning lights standard (see Section 6F.83).

**6F.83.2 Steady-Burn Electric Lamps****SUPPORT:**

Steady-Burn electric lamps are a series of low-wattage, yellow, electric lamps, generally hard-wired to a 110-volt external power source.

**OPTION:**

Steady-Burn electric lamps may be used in place of Type C Steady-Burn warning lights (see Section 6F.78).

**6F.83.3 Roadway Lighting****SUPPORT:**

On long term projects, the use of roadway lighting may be beneficial. Areas that may benefit from the installation of roadway lighting include high hazard areas, high volume areas, crossovers, diversions (bypasses), areas with sudden alignment changes, curves, intersections and transitions from multi-lane divided roadways to two-lane, two-way roadways.

**STANDARD:**

When possible, all roadway lighting shall be protected or have breakaway bases.

**6F.84 Temporary Traffic Control Signals****STANDARD:**

Temporary traffic control signals (see Section 4D.32) used to control road user movements through TTC zones and in other TTC situations shall meet the applicable provisions of Part 4.

**SUPPORT:**

Temporary traffic control signals are typically used in work zones such as temporary haul road crossings; temporary one-way operations along a one-lane, two-way highway; temporary one-way operations on bridges, reversible lanes, and intersections.

**STANDARD:**

A temporary traffic control signal that is used to control traffic through a one-lane, two-way section of roadway shall comply with the provisions of Section 4H.2.

**GUIDANCE:**

Where pedestrian traffic is detoured to a temporary traffic control signal, engineering judgment should be used to determine if pedestrian signals or accessible pedestrian signals (see Section 4E.9) are needed for crossing along an alternate route.

When temporary traffic control signals are used, conflict monitors typical of traditional traffic control signal operations should be used.

**OPTION:**

Temporary traffic control signals may be portable or temporarily mounted on fixed supports.

**GUIDANCE:**

Temporary traffic control signals should only be used in situations where temporary traffic control signals are preferable to other means of traffic control, such as changing the work staging or work zone size to eliminate one-way motor vehicle traffic movements, using flaggers to control one-way or crossing movements, using STOP or YIELD signs, and using warning devices alone.

**SUPPORT:**

Factors related to the design and application of temporary traffic control signals include the following:

- A. Safety and road user needs;
- B. Work staging and operations;
- C. The feasibility of using other TTC strategies (for example, flaggers, providing space for two lanes, or detouring road users, including bicyclists and pedestrians);
- D. Sight distance restrictions;
- E. Human factors considerations (for example, lack of driver familiarity with temporary traffic control signals);
- F. Road user volumes including roadway and intersection capacity;
- G. Affected side streets and driveways;
- H. Vehicle speeds;
- I. The placement of other TTC devices;
- J. Parking;
- K. Turning restrictions;
- L. Pedestrians;
- M. The nature of adjacent land uses (such as residential or commercial);
- N. Legal authority;
- O. Signal phasing and timing requirements;
- P. Full-time or part-time operation;
- Q. Actuated, fixed-time, or manual operation;
- R. Power failures or other emergencies;
- S. Inspection and maintenance needs;
- T. Need for detailed placement, timing, and operation records; and
- U. Operation by contractors or by others.

Although temporary traffic control signals can be mounted on trailers or lightweight portable supports, fixed supports offer superior resistance to displacement or damage by severe weather, vehicle impact, and vandalism.

**GUIDANCE:**

Other TTC devices should be used to supplement temporary traffic control signals, including warning and regulatory signs, pavement markings, and channelizing devices.

Temporary traffic control signals not in use should be covered or removed.

If a temporary traffic control signal is located within 1/2 mile of an adjacent traffic control signal, consideration should be given to interconnected operation.

**STANDARD:**

Temporary traffic control signals shall not be located within 200 feet of a grade crossing unless the temporary traffic control signal is provided with preemption in accordance with Section 4D.27, or unless a uniformed officer or flagger is provided at the crossing to prevent vehicles from stopping within the crossing.

**6F.85 Temporary Traffic Barriers****SUPPORT:**

Temporary traffic barriers are devices designed to help prevent penetration by vehicles while minimizing injuries to vehicle occupants, and designed to protect workers, bicyclists, and pedestrians.

There are five primary functions of temporary traffic barriers:

- A. To keep motor vehicle traffic from entering work areas, such as excavations or material storage sites;
- B. To separate workers, bicyclists, and pedestrians from motor vehicle traffic;
- C. To separate opposing directions of motor vehicle traffic; and
- D. To separate motor vehicle traffic, bicyclists, and pedestrians from the work area such as false work for bridges and other exposed objects; and
- E. To protect drop-offs of greater than 12 inches on longer term projects when a suitable buffer lane cannot be provided.

**OPTION:**

Temporary traffic barriers may be used to separate two-way motor vehicle traffic.

**GUIDANCE:**

Because of the risks to the driver and the risks involved in placement and removal of temporary traffic barriers, the following alternatives to using them should be strongly considered:

- A. Buffer lane closures;
- B. Nightly backfill of excavations;
- C. Temporary tapers;
- D. Temporary detours or crossovers;
- E. For lower speed projects, additional or closer spacing of channelizing devices in conjunction with extra delineation (TRPM's, pavement markings) and extra warning signs (in advance and within work area).

Because the protective requirements of a TTC situation have priority in determining the need for temporary traffic barriers, their use should be based on an engineering study. The following factors should be considered before using temporary traffic barriers:

- A. Speed/volume of traffic;
- B. Vertical/horizontal roadway alignment;
- C. Severity of hazard/excavation/obstacle;
- D. Lateral clearance to hazard;
- E. Duration of exposure;
- F. Duration of the TTC zone;
- G. Hazard presented by barrier itself once in place;
- H. Hazard presented to workers and traffic during barrier placement.

Tables 6F-5a and 6F-5b should be used to determine when temporary traffic barrier in edge drop-off situations.

Lateral Offset *	Depth of Drop-off
feet	inches
0 - 4	12 - 24
4 - 8	24 - 36
8 - 20	>36

\* Lateral offset is measured from the edge of the traffic carrying lane to the edge of the vertical drop-off.

**Table 6F-5a Drop-offs to Commonly Justify PCB Non-Construction Speed Limits of 45-55 mph**

Lateral Offset *	Depth of Drop-off
feet	inches
0 - 4	12 - 24
4 - 12	24 - 36
12 - 20	>36

\* Lateral offset is measured from the edge of the traffic carrying lane to the edge of the vertical drop-off.

**Table 6F-5b Drop-offs to Commonly Justify PCB Non-Construction Speed Limits of 60-70 mph**

**STANDARD:**

Temporary traffic barriers shall be supplemented with standard delineation, pavement markings, or channelizing devices for improved daytime and nighttime visibility if they are used to channelize vehicular traffic. The delineation color shall match the applicable pavement marking color.

All temporary traffic barriers shall be crashworthy.

Each type of temporary traffic barrier (steel, water-filled or concrete, etc.) requires a specific basic minimum length to achieve its crashworthy compliance. Refer to the barrier's crash testing results to determine the minimum length for predicted crash deflections. Shorter intermittent segments of temporary traffic barrier shall not be used because they nullify the containment and re-directive capabilities of the

temporary traffic barrier, increase the potential for serious injury both to vehicle occupants and pedestrians, and encourage the presence of blunt, leading ends. All upstream leading ends that are present shall be appropriately flared or protected with properly installed and maintained crashworthy cushions. Adjacent temporary traffic barrier segments shall be properly connected in order to provide the overall strength required for the temporary traffic barrier to perform properly.

In order to mitigate the effect of striking the end of a temporary traffic barrier, the end shall be installed in accordance with AASHTO's "Roadside Design Guide" (see Section 1A.11) by flaring until the end is outside the acceptable clear zone or by providing crashworthy end treatments (see Section 6F.76). See Figure 6F-9 for temporary traffic barrier placement and end treatments.

**OPTION:**

End attenuation may be necessary at both ends of barrier used on a two-lane two-way roadway.

**GUIDANCE:**

Since the barrier itself is a hazard, the use of it should be toward the overall safety benefit.

Excessive/acute tapers and pronounced turns/corners should be avoided. Tapers should be made as smooth as possible.

Sufficient area should be maintained behind the barrier to allow for deflection. Barriers should not typically be butted up to, or mounted on top of curbs or medians. Placing barriers across a curb section should be avoided.

Temporary traffic barriers should be anchored in any location that does not allow adequate area for deflection.

**SUPPORT:**

Temporary traffic barriers are designed to deflect when struck by a vehicle. Tapers, transition areas and barrier used outside of horizontal curves will see more deflection because of possibility higher angle hits. Tangent areas will generally see less deflection.

**STANDARD:**

Different designs of barrier shall not be intermixed on the same run of temporary traffic barrier. Barrier runs of different designs on the same project are acceptable, but the barrier runs shall not be connected.

**GUIDANCE:**

Separate shorter runs with different barrier design types should be discouraged if a longer run of one type is possible.

**STANDARD:**

Normal vertical curbing shall not be used as a substitute for temporary traffic barriers when temporary traffic barriers are clearly needed.

**OPTION:**

Warning lights or steady-burn electric lamps may be mounted on temporary traffic barrier installations. When in transition/taper areas or close to traffic lanes, retroreflective barrier markers or tape may be placed on barriers.

Depending on roadway geometrics, temporary speed reduction may be used in barrier areas.

**GUIDANCE:**

When serving the additional function of channelizing motor vehicle traffic, temporary traffic barriers should be a light color for increased visibility.

**SUPPORT:**

Temporary traffic barrier is subjected to considerable abuse. The placement process itself can cause damage to the base and ends. Connection loops can be bent and deformed when being placed. Temporary traffic barrier can also degrade over the long term. Barrier is often in place for long periods and is subject to winter road salt spray and snow plows. Over a period, delamination can result, often to the point of section loss. Also, the repeated process of transport and handling causes a good deal of longitudinal flexure, which can cause cracking.

**GUIDANCE:**

Barrier sections and connections should be routinely inspected for damage.

**SUPPORT:**

Movable barriers are capable of being repositioned laterally using a transfer vehicle that travels along the barrier. Movable barriers enable short-term closures to be installed and removed on long-term projects. Providing a barrier-protected work space for short-term closures and providing unbalanced flow to accommodate changes in the direction of peak-period traffic flows are two of the advantages of using movable barriers.

Figure 6H-45 shows a temporary reversible lane using movable barriers. The notable feature of the movable barrier is that in both Phase A and Phase B, the lanes used by opposing traffic are separated by a barrier.

Figure 6H-34 shows an exterior lane closure using a temporary traffic barrier. Notes 7 through 9 address the option of using a movable barrier. By using a movable barrier, the barrier can be positioned to close the lane during

the off-peak periods and can be relocated to open the lane during peak periods to accommodate peak traffic flows. With one pass of the transfer vehicle, the barrier can be moved out of the lane and onto the shoulder. Furthermore, if so desired, with a second pass of the transfer vehicle, the barrier could be moved to the roadside beyond the shoulder.

More specific information on the use of temporary traffic barriers is contained in Chapters 8 and 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11).

**6F.86 Crash Cushions****SUPPORT:**

Crash cushions are systems that mitigate the effects of errant vehicles that strike obstacles, either by smoothly decelerating the vehicle to a stop when hit head-on, or by redirecting the errant vehicle. The two types of crash cushions that are used in TTC zones are stationary crash cushions and truck-mounted attenuators. Crash cushions in TTC zones help protect the drivers from the exposed ends of barriers, fixed objects, shadow vehicles, and other obstacles. Specific information on the use of crash cushions can be found in AASHTO's "Roadside Design Guide" (see Section 1A.11).

**STANDARD:**

Crash cushions shall be crashworthy. They shall also be designed for each application to stop or redirect errant vehicles under prescribed conditions. Crash cushions shall be periodically inspected to verify that they have not been hit or damaged. Damaged crash cushions shall be promptly repaired or replaced to maintain their crashworthiness.

**SUPPORT:**

Stationary crash cushions are used in the same manner as permanent highway installations to protect drivers from the exposed ends of barriers, fixed objects, and other obstacles. More detailed information on the use of portable barriers and crash cushions can be obtained from Figure 6F-9.

**STANDARD:**

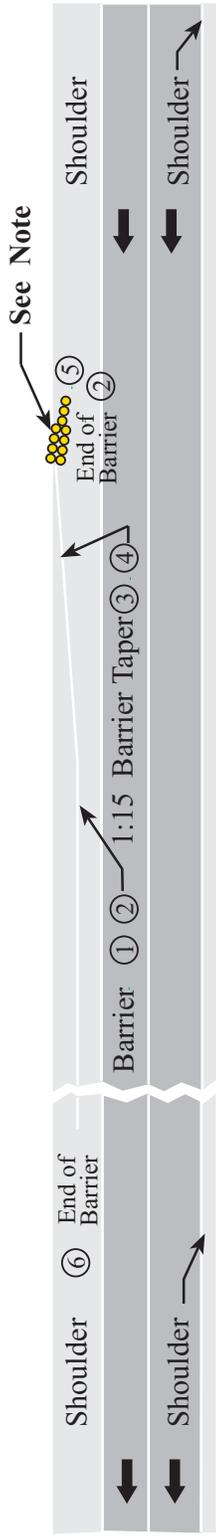
Stationary crash cushions shall be designed for the specific application intended.

Truck-mounted attenuators shall be energy-absorbing devices attached to the rear of shadow trailers or trucks. If used, the shadow vehicle with the attenuator shall be located in advance of the work area, workers, or equipment to reduce the severity of rear-end crashes from errant vehicles.

**SUPPORT:**

Trucks or trailers are often used as shadow vehicles to protect workers or work equipment from errant vehicles. These shadow vehicles are normally equipped with flashing arrows, changeable message signs, and/ or high-intensity

**Portable Concrete Barrier Placement**

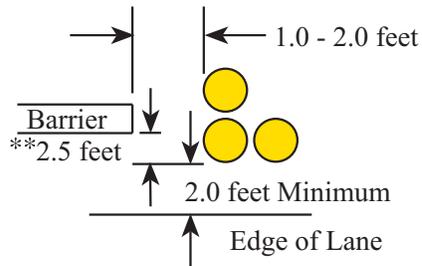


- ① It is desirable to maintain full shoulder width whenever possible. If that is not possible, the minimum desirable lateral offsets are based on the following posted speed limits:
  - 70 mph - 12.0 feet
  - 60 mph - 8.0 feet
  - 50 mph - 6.5 feet
  - 40 mph - 5.0 feet
 For restricted conditions, lesser offsets may be used. The offsets should be a minimum of 2 feet unless the conditions are extreme. Lateral offsets are measured to the bottom of the barrier. Barrier offset from the edge of the thru lane should not exceed 15 feet.
- ② Desirable treatments for exposed barrier ends are: a connection to existing barrier; impact attenuator; taper away to the edge of the clear zone; and extending through a plate beam guardrail by removing a panel.
  - For posted speed limits of 30 mph or less, the tapering away from the traffic is desirable and the use of an impact attenuator is optional.
- ③ A 1:8 taper may be used when the posted speed limit is 35 mph or less.  
A 1:12 taper may be used when the posted speed limit is 45 mph or less.
- ④ If the barrier is to be extended beyond the shoulder, additional fill will be needed in order to provide a flat (1:10) approach area to the barrier. (see Shoulder Fill detail in Figure 6F-6, Sheet 2 of 2)
- ⑤ The impact attenuator should be offset a minimum of 2 feet from the edge of the thru lane (see Sand Barrel Offset detail). The impact attenuator should be oriented to accommodate the probable impact angle of an encroaching vehicle. For most roadside conditions, an angle of approximately 10 degrees, as measured between the highway and the impact attenuators longitudinal centerline, is considered appropriate (see Shoulder Fill detail). For Sand Barrel Arrangement, see detail of Figure 6F-6, sheet 2 of 2).
- ⑥ For Two-Lane, Two-Way traffic, both ends of the barrier should be treated in the same manner as described in ②.

**Figure 6F-9 Portable Concrete Barrier Placement and End treatments**

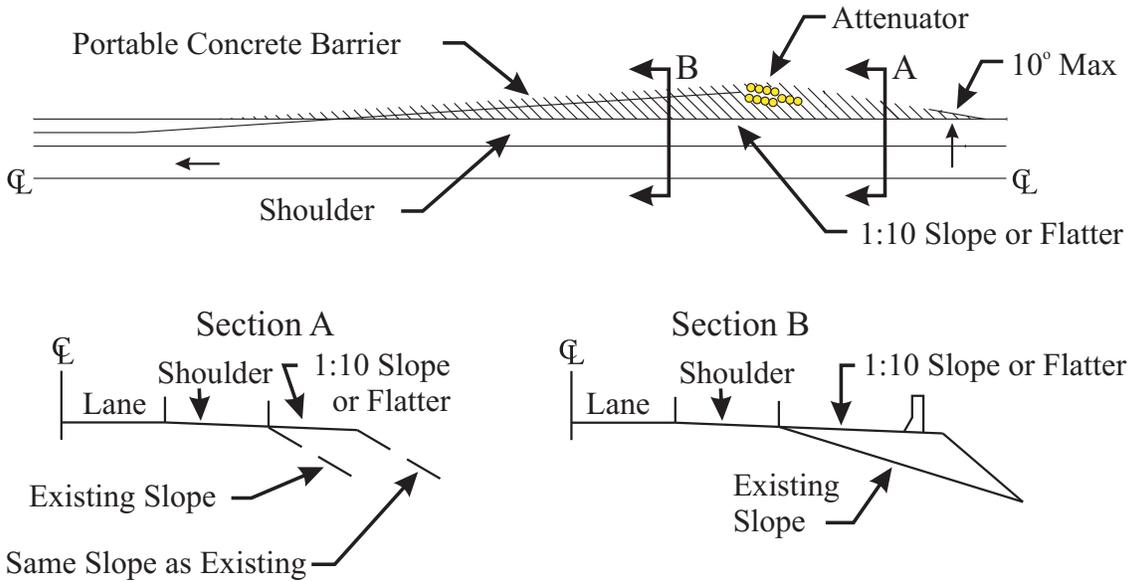
(Sheet 1 of 2)

### Sand Barrel Offset



\*\* Distance may be reduced to a minimum of 1.25 feet. This is acceptable only where a greater offset would cause unacceptable interference with traffic.

### Shoulder Fill



**Figure 6F-9 Portable Concrete Barrier Placement and End treatments**

(Sheet 2 of 2)

rotating, flashing, oscillating, or strobe lights located properly in advance of the workers and/or equipment that they are protecting. However, these shadow vehicles might themselves cause injuries to occupants of the errant vehicles if they are not equipped with truck-mounted attenuators.

**GUIDANCE:**

The shadow truck should be positioned in advance of the workers or equipment being protected so that there will be sufficient distance, but not so much so that errant vehicles will travel around the shadow truck and strike the protected workers and/or equipment. (see Chapter Part 6K-Temporary Traffic Control Zone Layouts for the recommended distance charts)

**SUPPORT:**

Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11) contains additional information regarding the use of shadow vehicles.

**GUIDANCE:**

If used, the truck-mounted attenuator should be used in accordance with the manufacturer's specifications.

## 6F.87 Rumble Strips

**SUPPORT:**

Transverse rumble strips consist of intermittent, narrow, transverse areas of rough-textured or slightly raised or depressed road surface that extend across the travel lanes to alert drivers to unusual vehicular traffic conditions. Through noise and vibration they attract the driver's attention to such features as unexpected changes in alignment and to conditions requiring a stop.

Longitudinal rumble strips consist of a series of rough-textured or slightly raised or depressed road surfaces located along the shoulder to alert road users that they are leaving the travel lanes.

**STANDARD:**

If it is desirable to use a color other than the color of the pavement for a longitudinal rumble strip, the color of the rumble strip shall be the same color as the longitudinal line the rumble strip supplements.

If the color of a transverse rumble strip used within a travel lane is not the color of the pavement, the color of the rumble strip shall be white, black, or orange.

**OPTION:**

Intervals between rumble strips may be reduced as the distance to the approached conditions is diminished in order

to convey an impression that a closure speed is too fast and/or that an action is imminent. A sign warning drivers of the onset of rumble strips may be placed in advance of any rumble strip installation.

**GUIDANCE:**

Transverse rumble strips should be placed transverse to motor vehicle traffic movement. They should not adversely affect overall pavement skid resistance under wet or dry conditions.

In urban areas, even though a closer spacing might be warranted, transverse rumble strips should be designed in a manner that does not promote unnecessary braking or erratic steering maneuvers by road users.

Transverse rumble strips should not be placed on sharp horizontal or vertical curves.

Rumble strips should not be placed through pedestrian crossings or within marked bicycle lanes.

Transverse rumble strips should not be placed on roadways used by bicyclists unless a minimum clear path of 4 feet is provided at each edge of the roadway or on each paved shoulder as described in AASHTO's "Guide to the Development of Bicycle Facilities" (see Section 1A.11).

Longitudinal rumble strips should not be placed on the shoulder of a roadway that is used by bicyclists unless a minimum clear path of 4 feet is also provided on the shoulder.

## 6F.88 Screens

**SUPPORT:**

Screens are used to block the road users' view of activities that can be distracting. Screens might improve safety and motor vehicle traffic flow where volumes approach the roadway capacity because they discourage gawking and reduce headlight glare from oncoming motor vehicle traffic.

**GUIDANCE:**

Screens should not be mounted where they could adversely restrict motorist visibility and sight distance and adversely affect the safe operation of vehicles.

**OPTION:**

Screens may be mounted on the top of temporary traffic barriers that separate two-way motor vehicle traffic.

**GUIDANCE:**

Design of screens should be in accordance with Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11).



If the equipment travels on or crosses the roadway, it should be equipped with appropriate flags, flashing lights, and/or a SLOW MOVING VEHICLE symbol. If vehicles are using the shoulder, a ROAD WORK AHEAD (W20-1) or SHOULDER WORK (W21-5) sign is appropriate.

## 6G.7 Work on the Shoulder with No Encroachment

### SUPPORT:

The provisions of this Section apply to short-term through long-term stationary operations.

### GUIDANCE:

Parking lanes should be treated the same as shoulders. They should be posted for any restrictions at least 24 hours prior to commencing work.

### STANDARD:

If the parking lane is normally open to vehicle travel during the time of day the closure will be in effect, the parking lane shall be considered a traveled lane.

When a highway shoulder is occupied, warning is needed to advise the driver and protect the workers. A single warning sign SHOULDER WORK or ROAD WORK AHEAD shall be used.

When paved shoulders having a width of 8 feet or more are closed, at least one advance warning sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct motor vehicle traffic to remain within the traveled way.

### GUIDANCE:

When paved shoulders having a width of 8 feet or more are closed on freeways and expressways, road users should be warned about potential disabled vehicles that cannot get off the traveled way. An initial general warning sign, such as ROAD WORK AHEAD (W20-1), should be used, followed by a RIGHT or LEFT SHOULDER CLOSED (W21-5a) sign. Where the downstream end of the shoulder closure extends beyond the distance that can be perceived by road users, a supplementary plaque bearing the message NEXT XX FEET (W16-4P) or MILES (W7-3aP) should be placed below the SHOULDER CLOSED (W21-5a) sign. On multi-lane, divided highways, signs advising of shoulder work or the condition of the shoulder should be placed only on the side of the affected shoulder.

When an improved shoulder is closed on a high-speed roadway, it should be treated as a closure of a portion of the

road system because road users expect to be able to use it in emergencies. Road users should be given ample advance warning that shoulders are closed for use as refuge areas throughout a specified length of the approaching TTC zone. The sign(s) should read SHOULDER CLOSED (W21-5a) with distances indicated. The work space on the shoulder should be closed off by a taper or channelizing devices with a length of  $1/3 L$  using the formulas in Tables 6C-3 and 6C-4.

When the shoulder is not occupied but work has adversely affected its condition, other warning signs and devices are appropriate. The LOW SHOULDER (W8-9), NO SHOULDER (W8-23), HIGH SHOULDER (W21-X9) or SOFT SHOULDER (W8-4) sign should be used. See Figures 6K-3, 4, and 5 in the Field Manual for longitudinal drop offs and Sections 6F-44.2 through 6F-44.4. In areas where the speed limit is greater than 30 mph and the condition extends over a distance in excess of one mile, the sign should be repeated at one mile intervals. In areas where the speed limit is 30 mph or less, the sign should be repeated at 1/4 mile increments.

### OPTION:

In addition, a supplementary plaque bearing the message NEXT XX MILES (W7-3aP) may be placed below the first such warning sign. Temporary traffic barriers may be needed to inhibit encroachment of errant vehicles into the work space and to protect workers.

### GUIDANCE:

Signs advising of shoulder work or the condition of the shoulder should be placed only on the side of the affected shoulder.

### STANDARD:

When used for shoulder work, arrow boards shall operate only in the caution mode.

### OPTION:

If work is directly adjacent to the travel lane, workers need to be protected. In some instances, this may require the use of portable barriers.

## 6G.8 Work on the Shoulder with Minor Encroachment

### SUPPORT:

Chapter 6D and Sections 6F.74 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

**GUIDANCE:**

When work takes up part of a lane, vehicular traffic volumes, vehicle mix (buses, trucks, cars, and bicycles), speed, and capacity should be analyzed to determine whether the affected lane should be closed. Unless the lane encroachment permits a remaining lane width of 10 feet, the lane should be closed.

Truck off-tracking should be considered when determining whether the minimum lane width of 10 feet is adequate.

Traffic should not be directed onto a lane that is only partially paved.

**OPTION:**

A lane width of 9 ft may be used for short-term stationary work on intermediate volume, low-speed roadways when motor vehicle traffic does not include longer and wider heavy commercial vehicles.

**6G.9 Work Within the Median****SUPPORT:**

Chapter 6D and Sections 6F.68 and 6G.5 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

**OPTION:**

If the work is in a narrow median of a divided highway, traffic control for both directions of travel may be necessary.

**GUIDANCE:**

If work in the median of a divided highway is within 15 feet from the edge of the traveled way for either direction of travel, TTC should be used through the use of advance warning signs and channelizing devices.

If the work is long term, the use of portable barriers should be considered.

**6G.9.1 Detours and Diversions****SUPPORT:**

Detour signing is usually designed by the traffic engineer with authority over the closed roadway because it is considered a traffic routing problem. Detour signs are used to direct traffic onto another roadway. At diversions, road users are directed onto a temporary roadway or alignment placed within or adjacent to the right-of-way. Typical applications for detouring or diverting road users on two-lane highways are shown in Layouts 6J-16, 6J-17, and 6J-18. Layout 6J-15 illustrates the controls around an area where a section of roadway has been closed and a diversion has been constructed. Channelizing devices and pavement markings

are used to indicate the transition to the temporary roadway.

**GUIDANCE:**

A diversion (bypass) should be designed the same as a crossover (see Section 6G.16).

**OPTION:**

A diversion may carry either one direction or both directions of traffic.

**GUIDANCE:**

When the detour is long, Detour (M4-8, M4-9) signs should be installed periodically and at major intersections to remind and reassure drivers that they are still on a detour.

When a roadway is closed at some point beyond the detour, traffic should be advised as to what location the road is open. If local road users are allowed to use the roadway up to the closure, the ROAD CLOSED AHEAD, LOCAL TRAFFIC ONLY (R11-3a) sign should be used. The portion of the road open to local road users should have adequate signing, marking, and delineation.

Detours should be signed so that traffic will be able to get through the entire detour area and back to the original roadway.

When an entire roadway is closed, as illustrated in Layout 6J-19, a detour should be provided and road users should be warned in advance of the closure, which in this example is a closure 16 km (10 mi) from the intersection.

**6G.10 Work Within the Traveled Way of a Two-Lane Highway****SUPPORT:**

Chapter 6D and Sections 6F.68 and 6G.5 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

Techniques for one lane, two-way traffic control are described in Section 6C-10.

**STANDARD:**

When one lane of a two lane road is closed, the remaining lane shall accommodate both lanes of travel. A minimum lane width of 10 feet shall be maintained at all times (see Section 6H-3).

**OPTION:**

On intermediate volume residential streets, traffic may be self regulating.

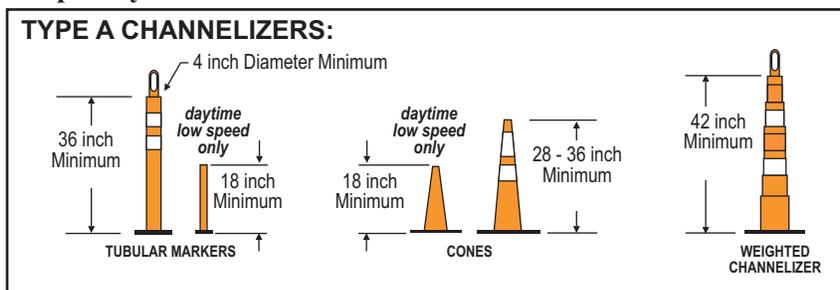
Where conditions permit, parking may be prohibited and traffic shifted into the parking lanes.

## Temporary Traffic Control Distance Charts

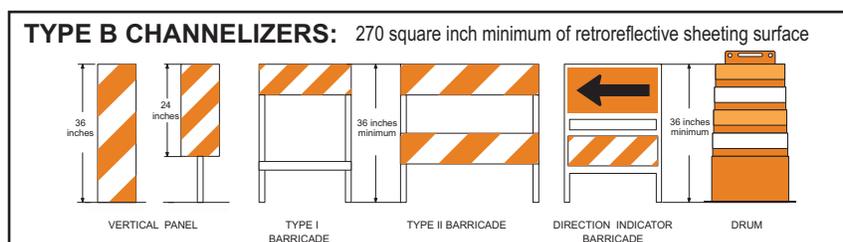
Posted Speed Limit Prior to Work Starting (mph)		Advance Warning Sign Spacing (A) feet	Decision Sight Distance (D) feet	Taper Length (12 ft lane) (L) feet	Shifting Taper (L/2) feet	Typical Shoulder Taper (L/3) feet
0 - 30	G = 25 ft	250	550	200	100	75
35 - 40		325	700	325	175	125
45 - 50	G = 50 ft	600	900	600	300	200
55		750	1200	700	350	250
60 - 65		1000	1400	800	400	275
70 - 75		1200	1600	900	450	300

Posted Speed Limit Prior to Work Starting (mph)	Buffer Space (B) feet	Shadow Vehicle Following Distance (F) feet	Protection Vehicle Roll-Ahead Buffer Distance (with or without TMA) (R)	
			Moving (15 mph max) feet	Stopped feet
0 - 30	G = 25 ft	250 - 550	100	100
35 - 40		325 - 700	100	100
45 - 50	G = 50 ft	600 - 900	175	125
55		750 - 1200	175	125
60 - 65		1000 - 1400	225	175
70 - 75		1200 - 1600	225	175

Type A channelizing devices are typically used in attended temporary traffic control zones.\*



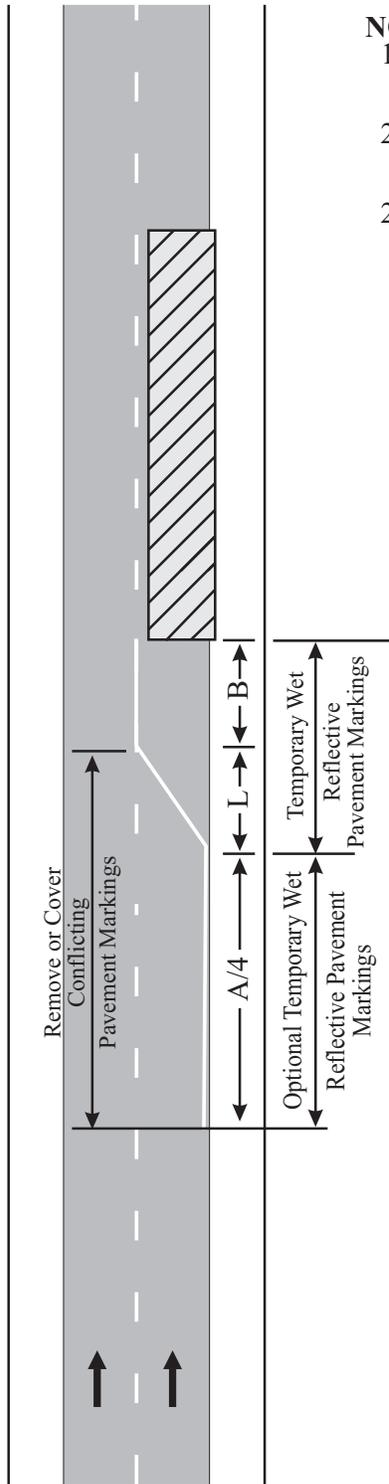
Type B channelizing devices shall be used if the temporary traffic control zone will be installed for more than 12 hours or if it is left unattended.\*



\* See the MN MUTCD, Part 6F for more details on application restrictions.

Figure 6J-2 Temporary Traffic Control Devices and Distance Charts





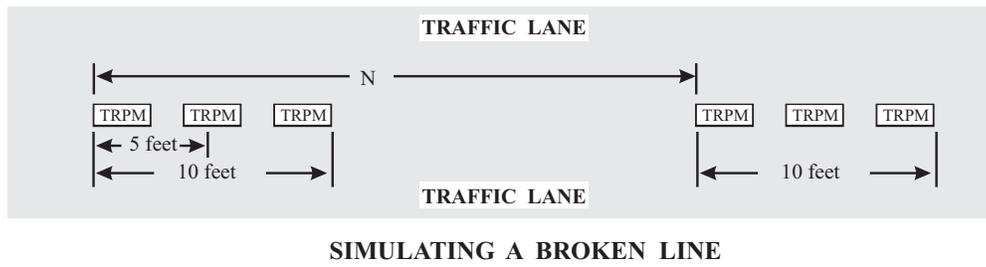
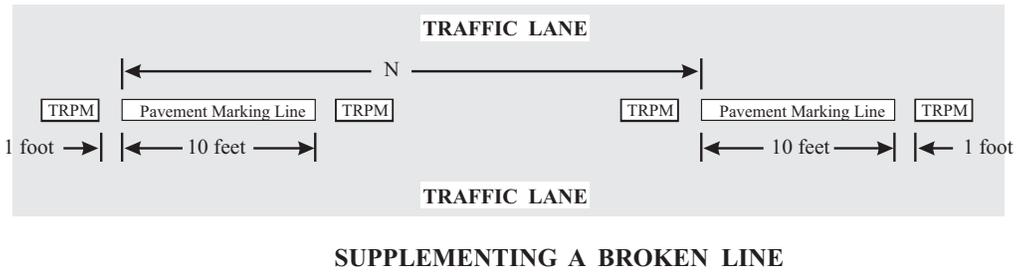
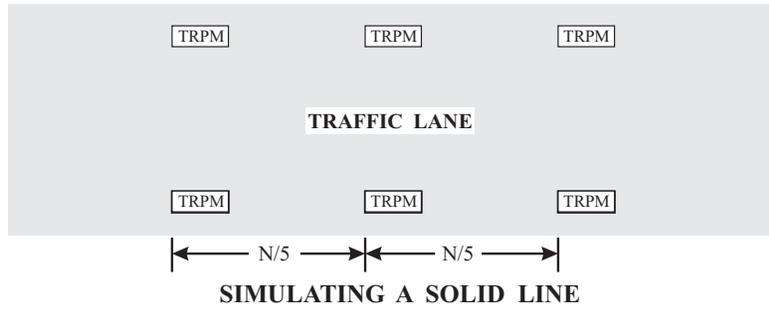
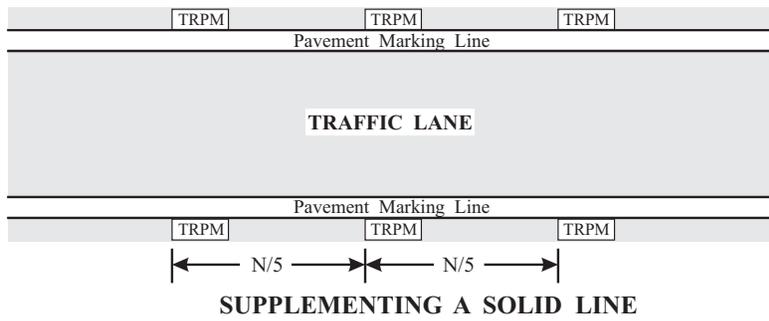
**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. Traffic control devices are not shown. Use appropriate lane closure.
2. Install wet reflective edgelines through the transition and alignment change areas including lane closure tapers, sharp curves, exits, shifts onto temporary roadways, etc.

**TYPICAL STRIPING AND STRIPE REMOVAL  
FOR LANE CLOSURE  
MULTILANE DIVIDED ROAD**

LONG TERM

LAYOUT 6J-1



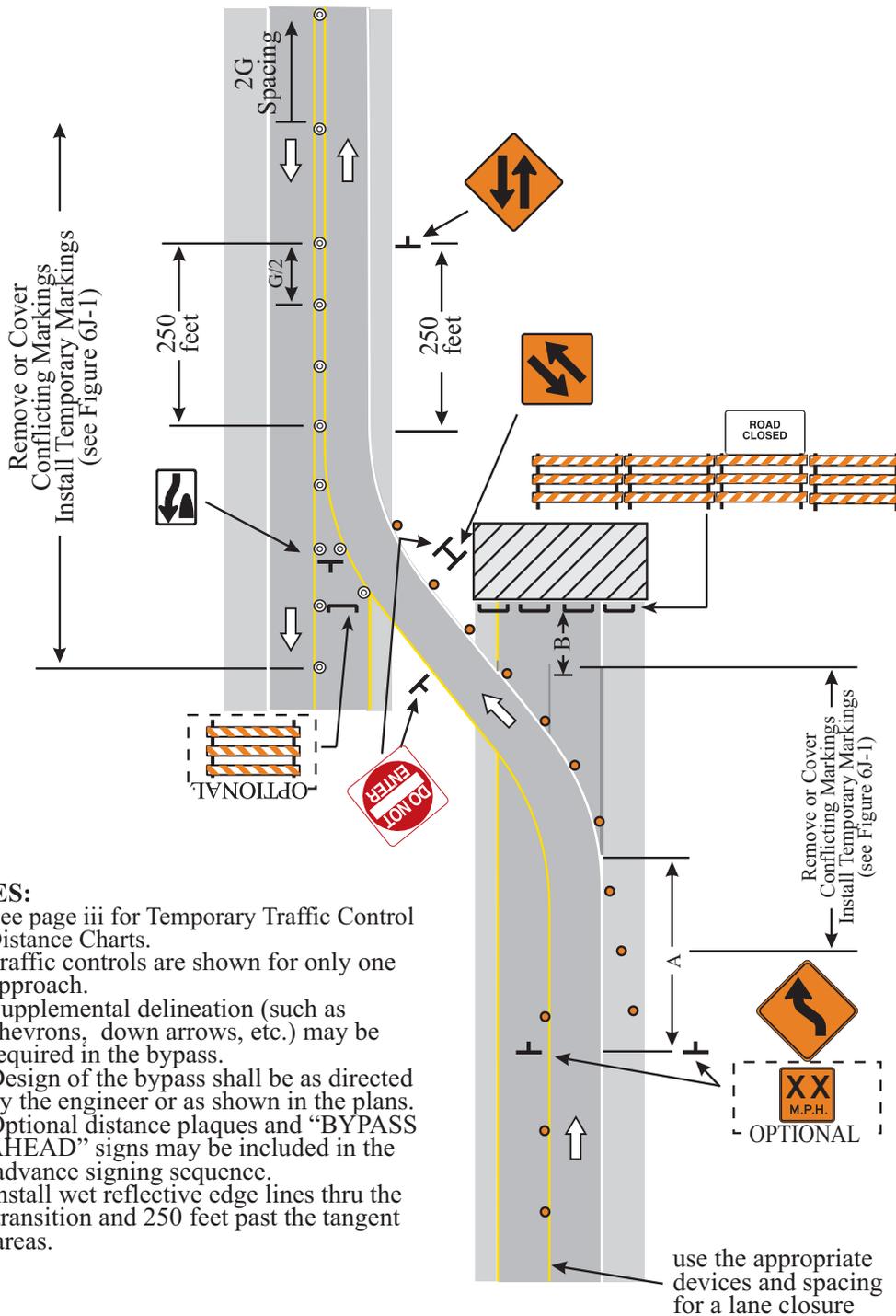
N = the length of one line segment plus one gap

## PLACEMENT AND SPACING OF TEMPORARY RAISED PAVEMENT MARKERS (TRPMs)

LONG TERM

LAYOUT 6J-2





**NOTES:**

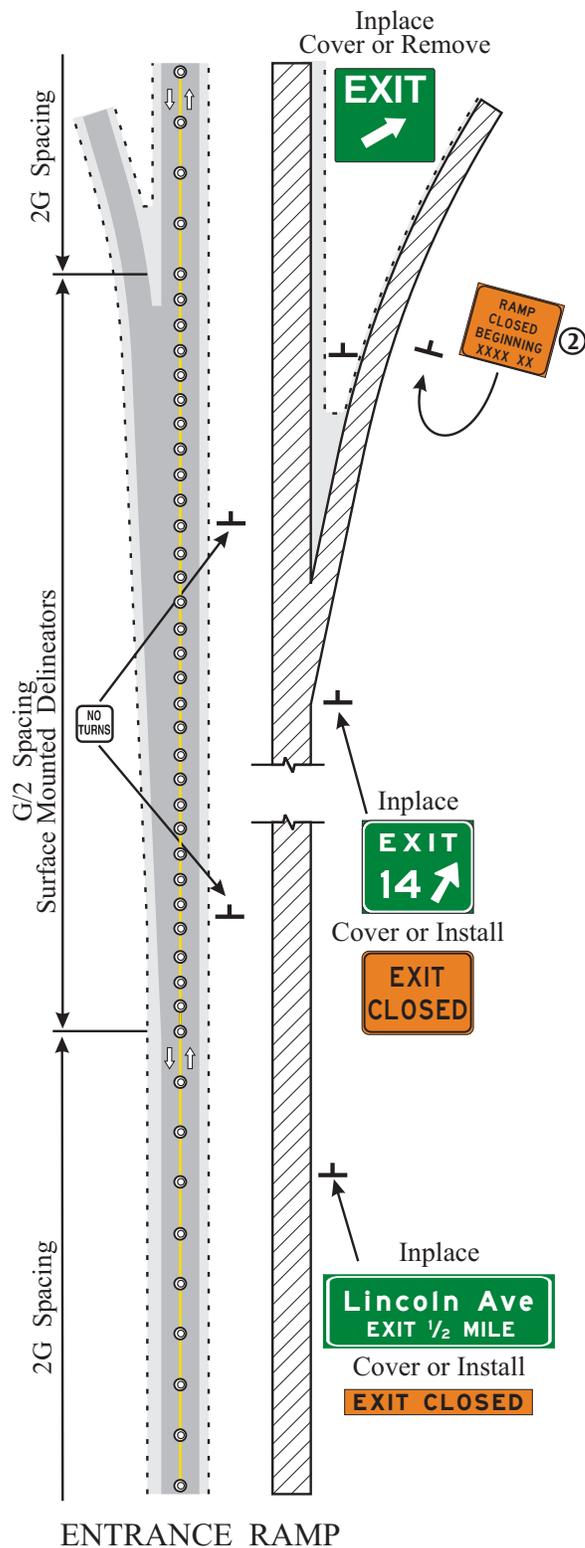
1. See page iii for Temporary Traffic Control Distance Charts.
2. Traffic controls are shown for only one approach.
3. Supplemental delineation (such as chevrons, down arrows, etc.) may be required in the bypass.
4. Design of the bypass shall be as directed by the engineer or as shown in the plans.
5. Optional distance plaques and "BYPASS AHEAD" signs may be included in the advance signing sequence.
6. Install wet reflective edge lines thru the transition and 250 feet past the tangent areas.

**TYPICAL CROSSOVER TO  
TWO-LANE, TWO-WAY OPERATIONS  
MULTILANE DIVIDED ROAD**

LONG TERM

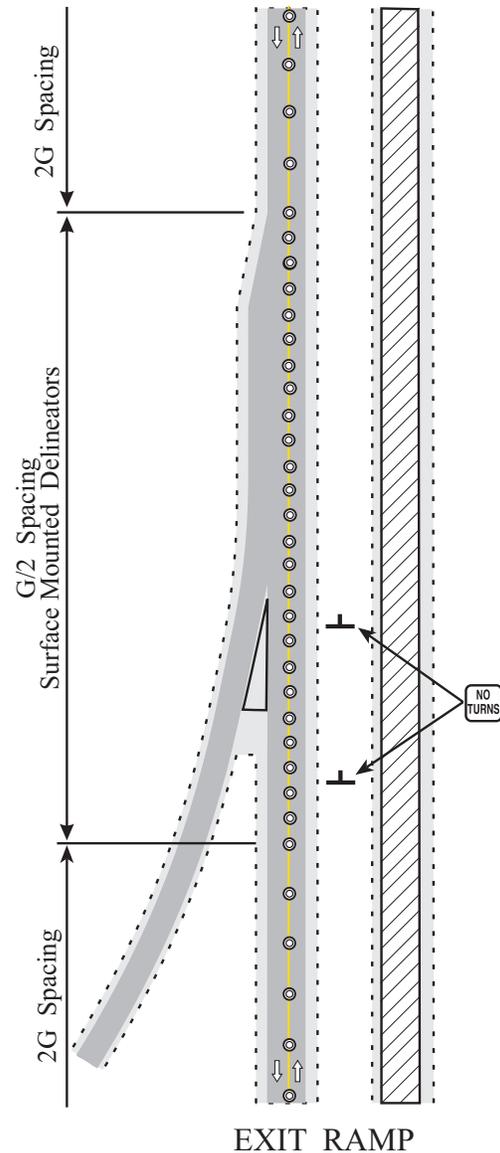
LAYOUT 6J-4





**NOTES:**

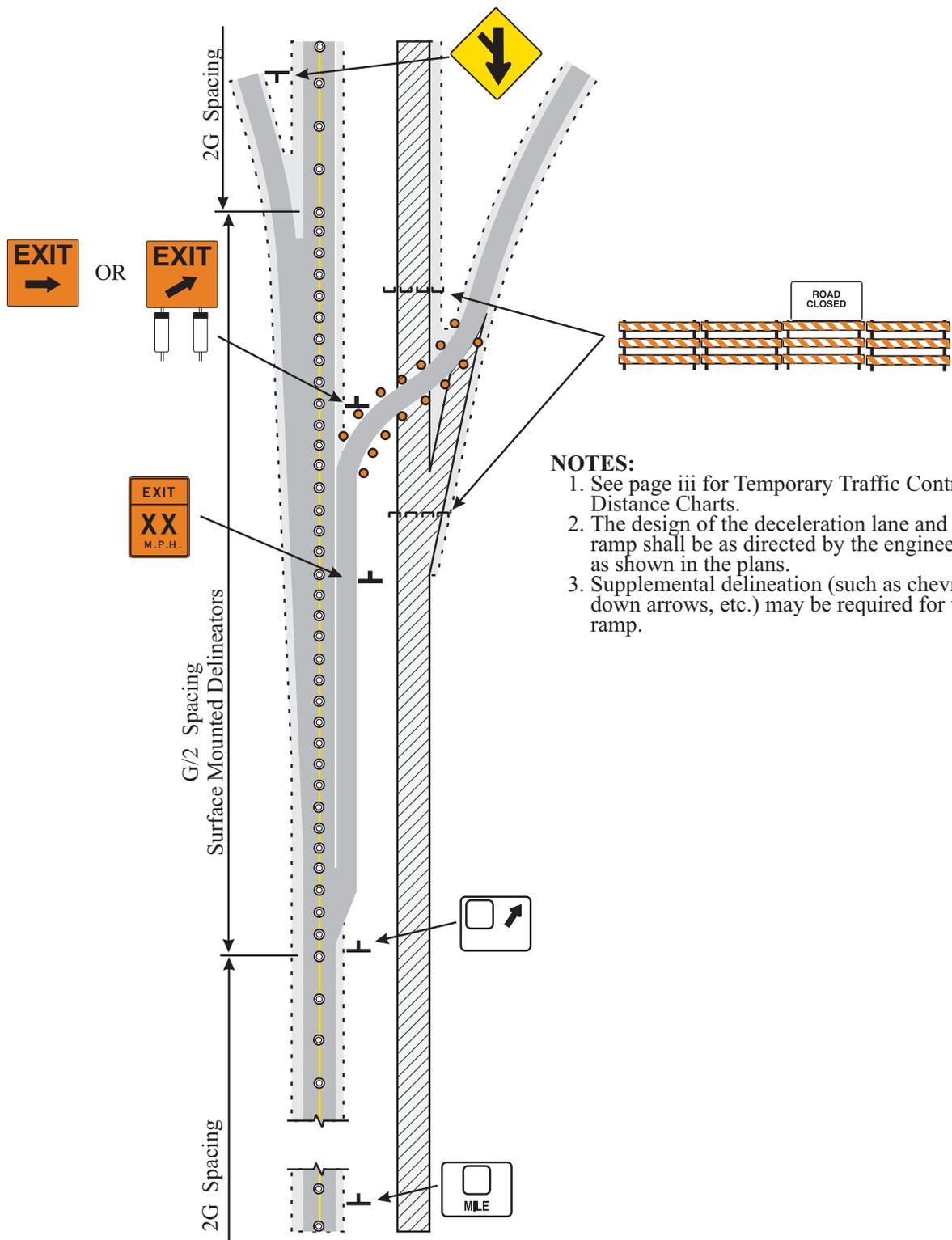
1. See page iii for Temporary Traffic Control Distance Charts.
2. Install at least 7 days prior to the start of work.



**TWO-LANE, TWO-WAY OPERATIONS  
AT RAMPS ON OPEN ROADWAY**

LONG TERM

LAYOUT 6J-6



- NOTES:**
1. See page iii for Temporary Traffic Control Distance Charts.
  2. The design of the deceleration lane and exit ramp shall be as directed by the engineer or as shown in the plans.
  3. Supplemental delineation (such as chevrons, down arrows, etc.) may be required for the ramp.

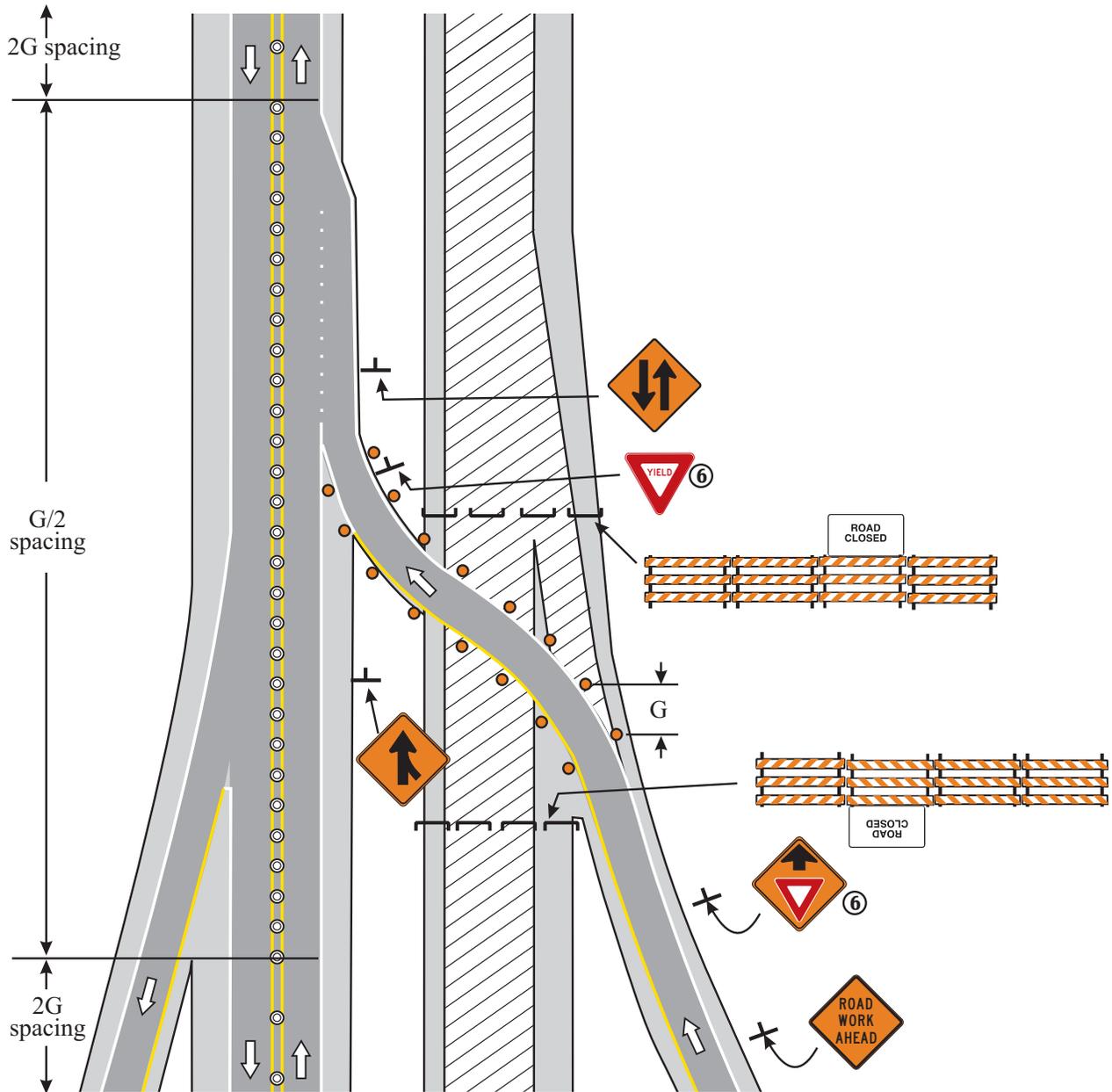
**TWO-LANE, TWO-WAY OPERATION  
AT EXIT RAMP ACROSS CLOSED ROADWAY**

LONG TERM

LAYOUT 6J-7

**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. The design of the acceleration lane and entrance ramp shall be as directed by the engineer or as shown in the plans.
3. Supplemental delineation (such as chevrons, down arrows, etc.) may be required for the ramp.
4. The advance warning sign spacing is dependent on the ramp length and the location of inplace signing. The spacing should be as long as is practical.
5. Remove conflicting pavement markings and install temporary markings (see Figure 6J-1).
6. When an adequate acceleration lane is provided, this sign should be omitted.



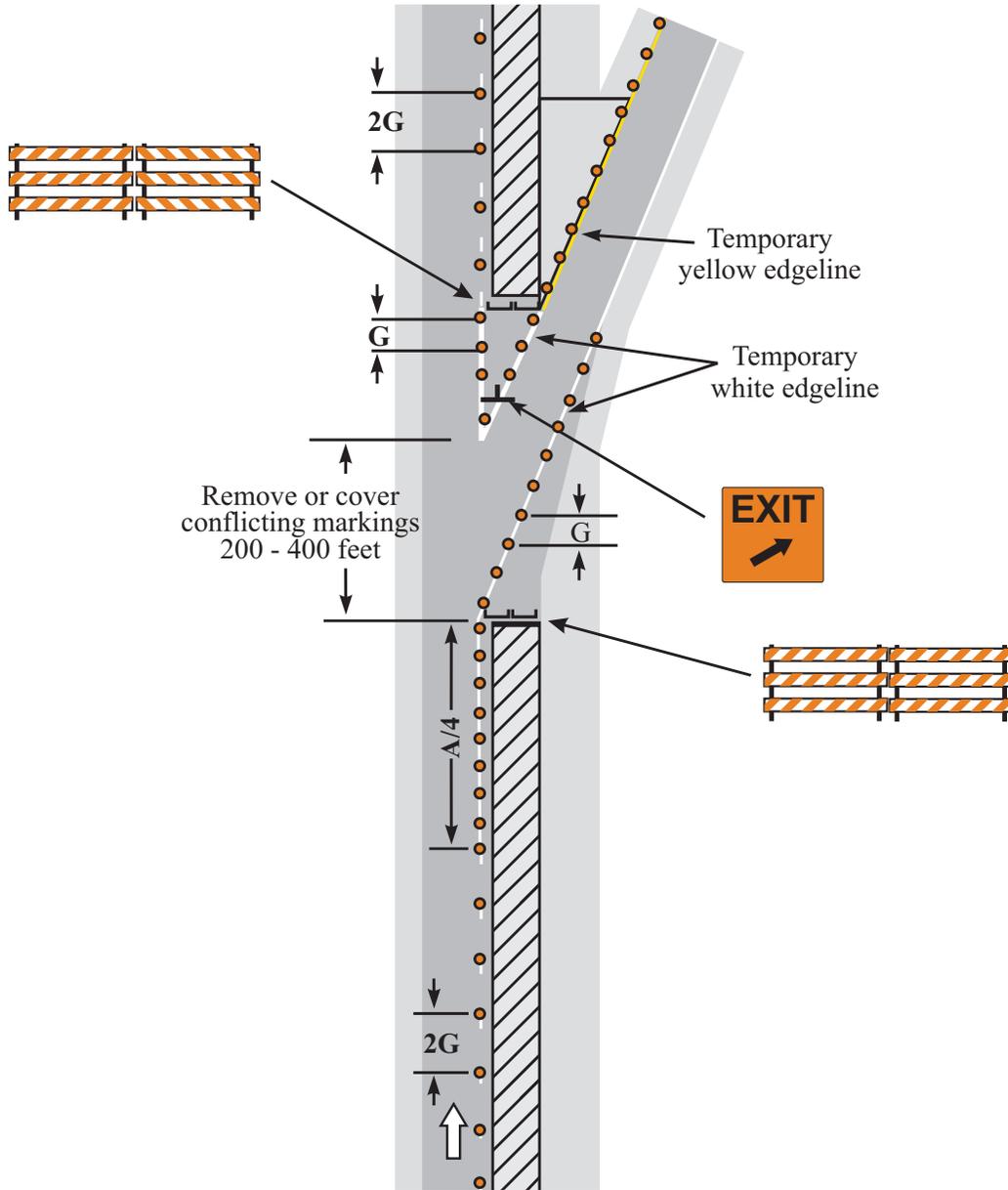
**TWO-LANE, TWO-WAY OPERATION  
AT ENTRANCE RAMP ACROSS CLOSED ROADWAY**

LONG TERM

LAYOUT 6J-8

**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. The design of the deceleration lane and the exit ramp shall be as directed by the engineer or as shown in the plans.
3. The advance warning sign spacing is dependent on the ramp length and the location of inplace signing. The spacing should be as long as is practical.

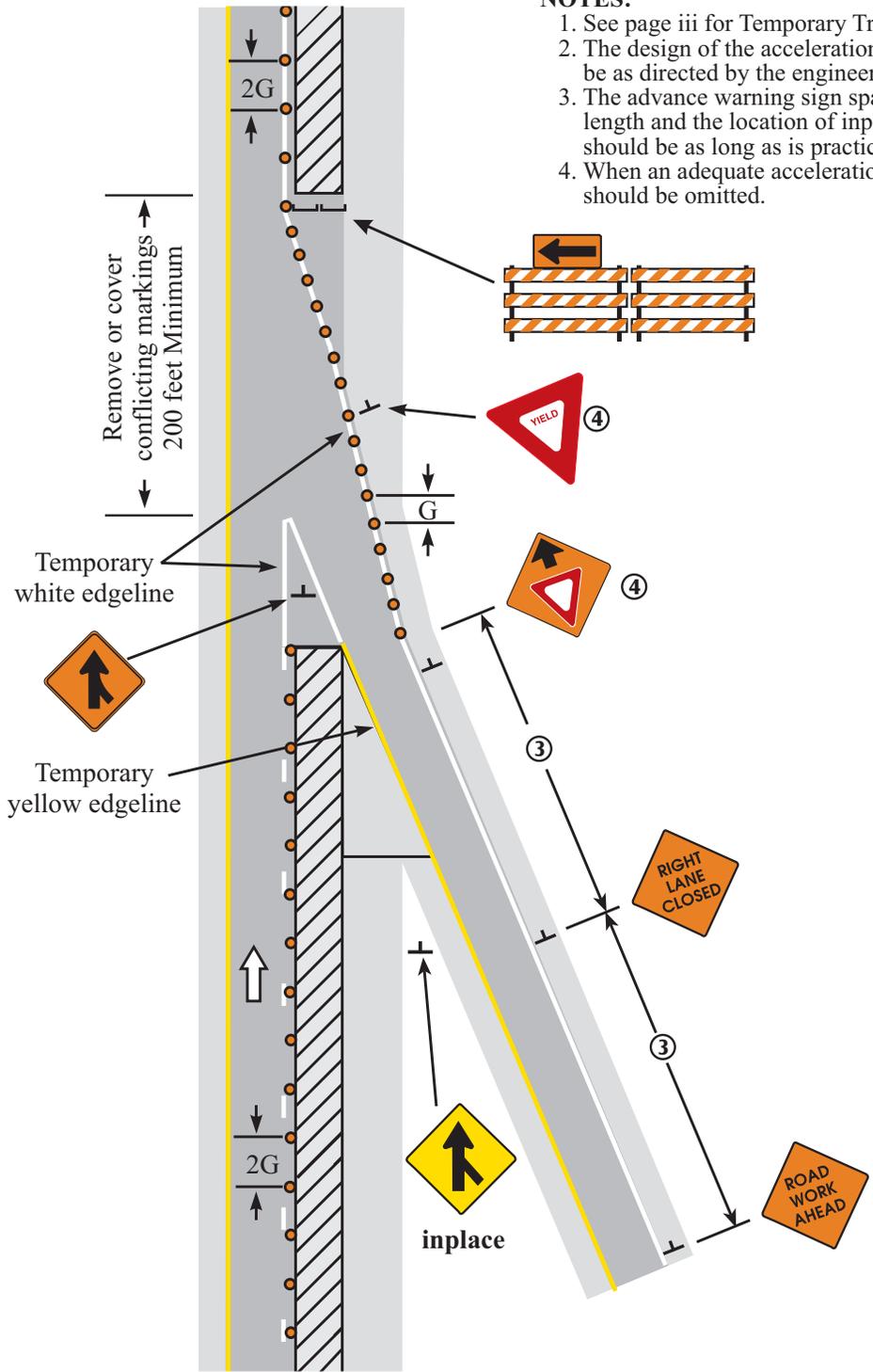


Use appropriate devices and spacing for lane closure.

**MAINLINE RIGHT LANE CLOSED  
EXIT RAMP OPEN**

LONG TERM

LAYOUT 6J-9



**NOTES:**

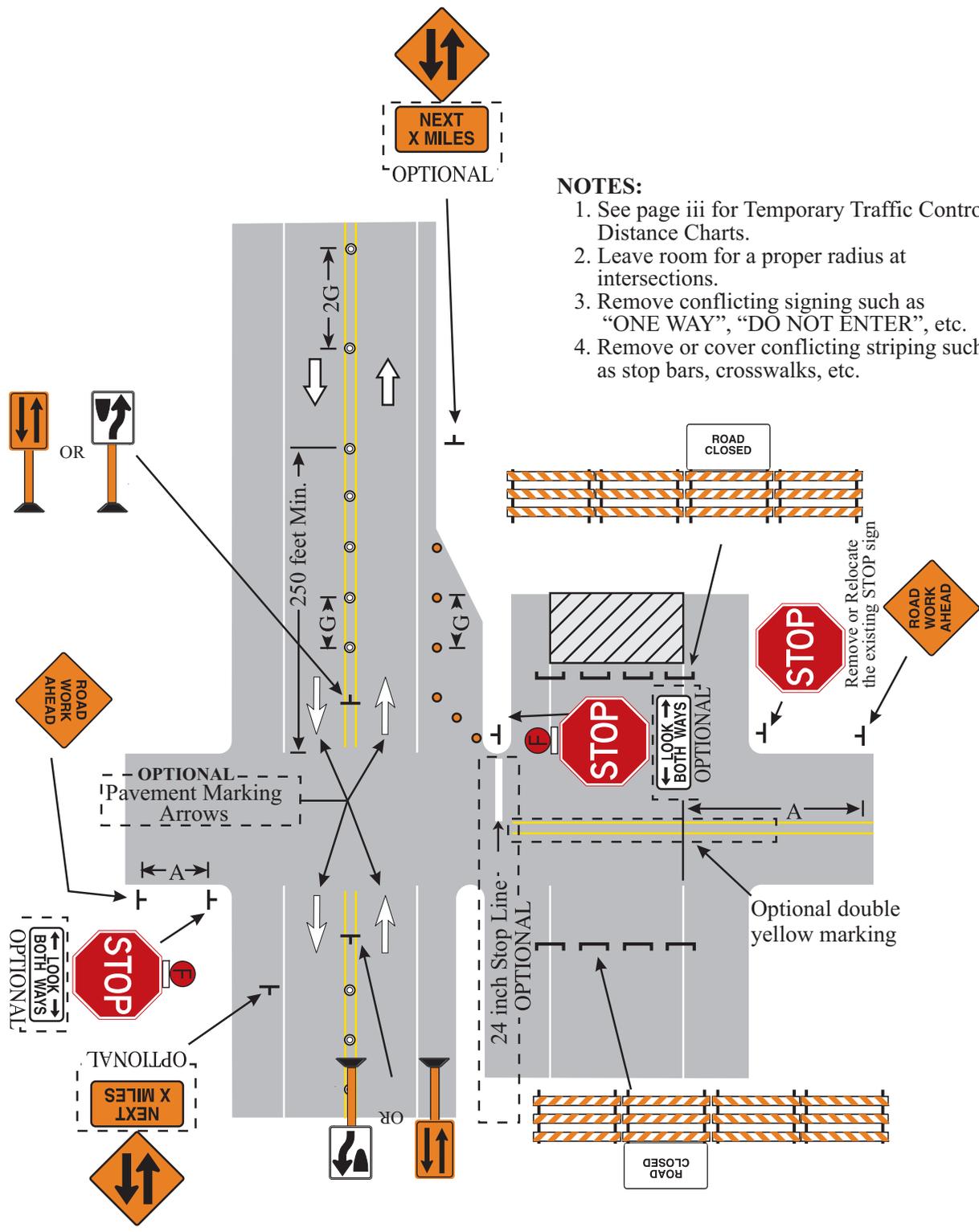
1. See page iii for Temporary Traffic Control Distance Charts.
2. The design of the acceleration lane and the entrance ramp shall be as directed by the engineer or as shown in the plans.
3. The advance warning sign spacing is dependent on the ramp length and the location of inplace signing. The spacing should be as long as is practical.
4. When an adequate acceleration lane is provided, this sign should be omitted.

Use the appropriate devices and spacing for a lane closure.

**MAINLINE RIGHT LANE CLOSED  
ENTRANCE RAMP OPEN**

LONG TERM

LAYOUT 6J-10



- NOTES:**
1. See page iii for Temporary Traffic Control Distance Charts.
  2. Leave room for a proper radius at intersections.
  3. Remove conflicting signing such as "ONE WAY", "DO NOT ENTER", etc.
  4. Remove or cover conflicting striping such as stop bars, crosswalks, etc.

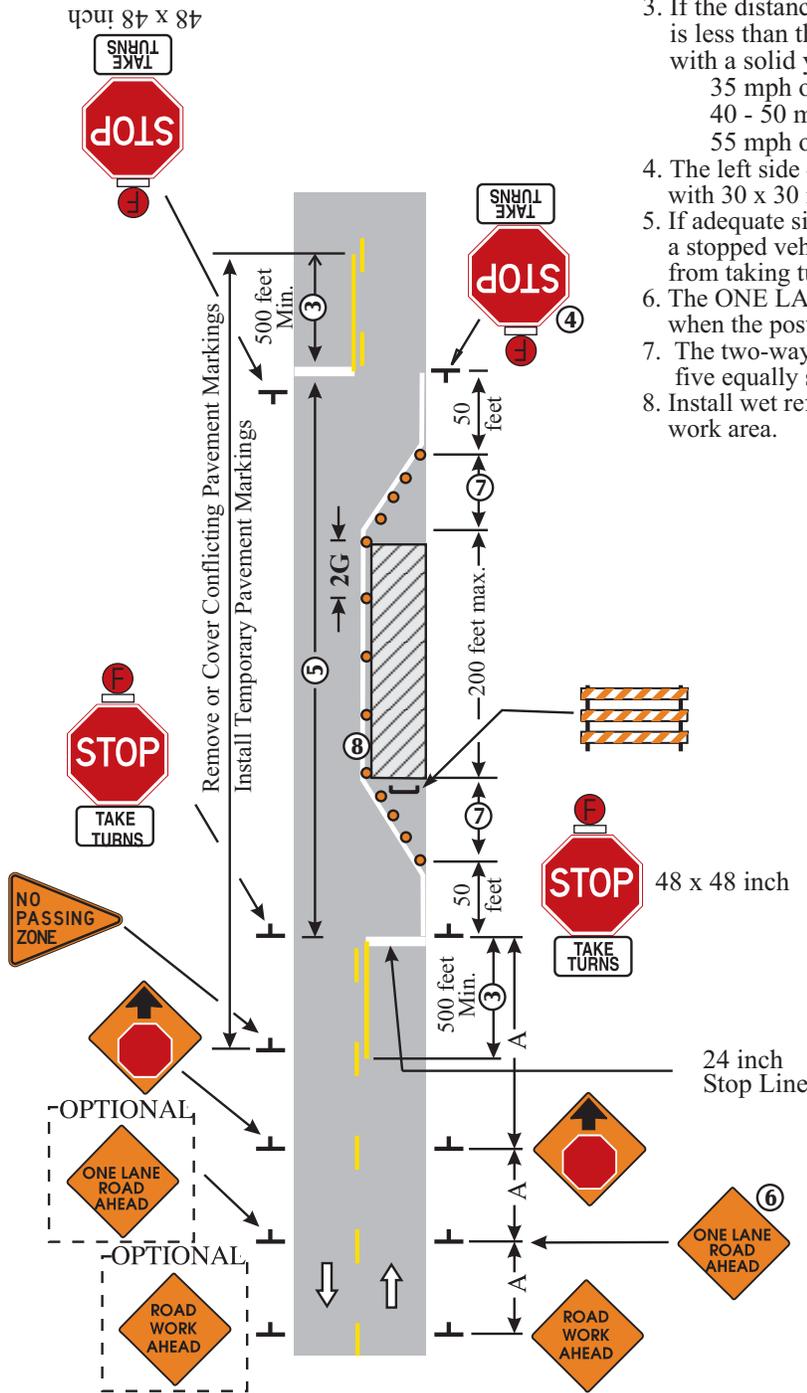
**TWO-LANE, TWO-WAY OPERATION THROUGH TYPICAL INTERSECTION**

LONG TERM

LAYOUT 6J-11

**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. Approach signs and marking is the same in both directions.
3. If the distance from an in-place "NO PASSING ZONE" is less than the following, the zones shall be connected with a solid yellow line:
  - 35 mph or less - 500 feet
  - 40 - 50 mph - 600 feet
  - 55 mph or greater - 800 feet
4. The left side 48 x 48 inch STOP signs may be replaced with 30 x 30 inch STOP signs.
5. If adequate sight distance is not available to recognize a stopped vehicle or traffic volume restricts vehicles from taking turns through the open lane, use Layout 6J-13.
6. The ONE LANE ROAD AHEAD sign may be omitted when the posted speed limit is 40 mph or less.
7. The two-way taper should be 50 feet in length using five equally spaced channelizing devices.
8. Install wet reflective edgeline through tapers and the work area.



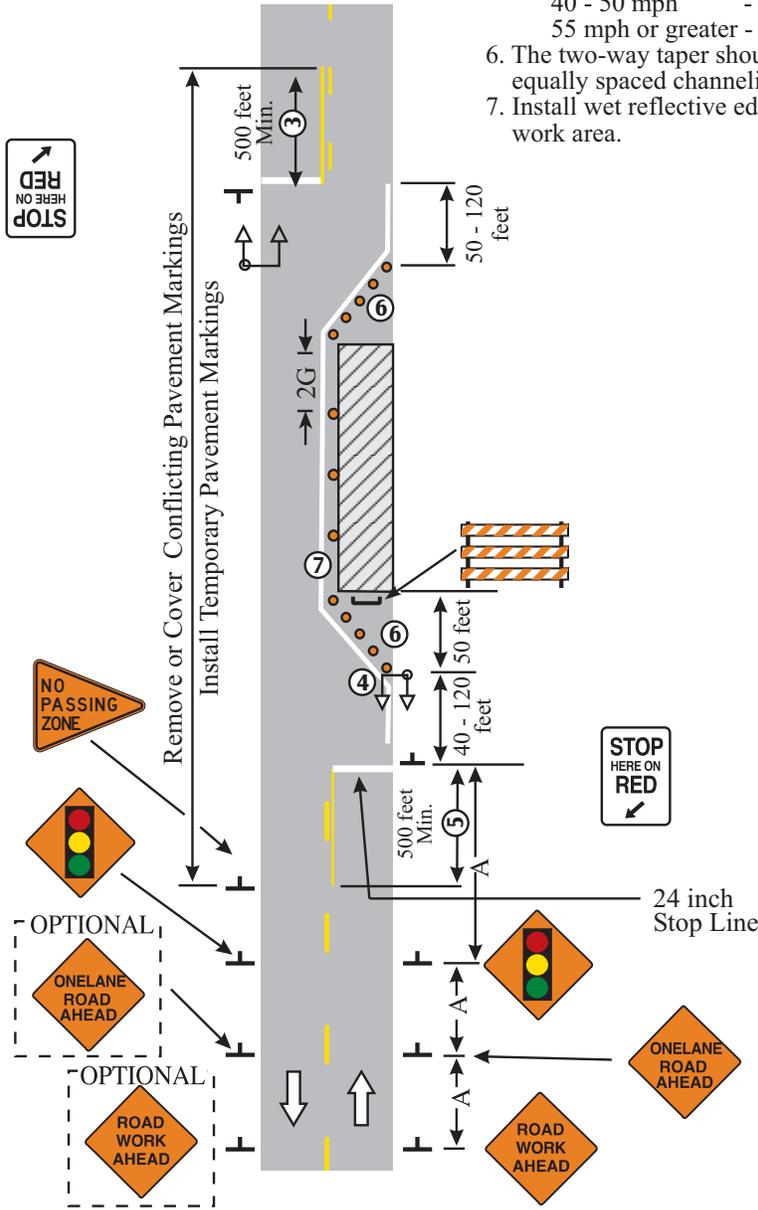
**LANE CLOSURE WITH STOP SIGNS  
TWO-LANE, TWO-WAY ROAD**

LONG TERM

LAYOUT 6J-12

**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. Approach signing and marking is the same in both directions.
3. Signal timing shall be established by qualified personnel.
4. Two signal heads shall be installed per approach. The first shall be installed on the right shoulder. The second signal head may be installed on either the left shoulder or mounted over head on the same structure as the first signal head.
5. If the distance from an in-place "NO PASSING ZONE" is less than the following, the zones shall be connected with a solid yellow line:
  - 35 mph or less - 500 feet
  - 40 - 50 mph - 600 feet
  - 55 mph or greater - 800 feet
6. The two-way taper should be 50 feet in length using five equally spaced channelizing devices.
7. Install wet reflective edgeline through tapers and the work area.



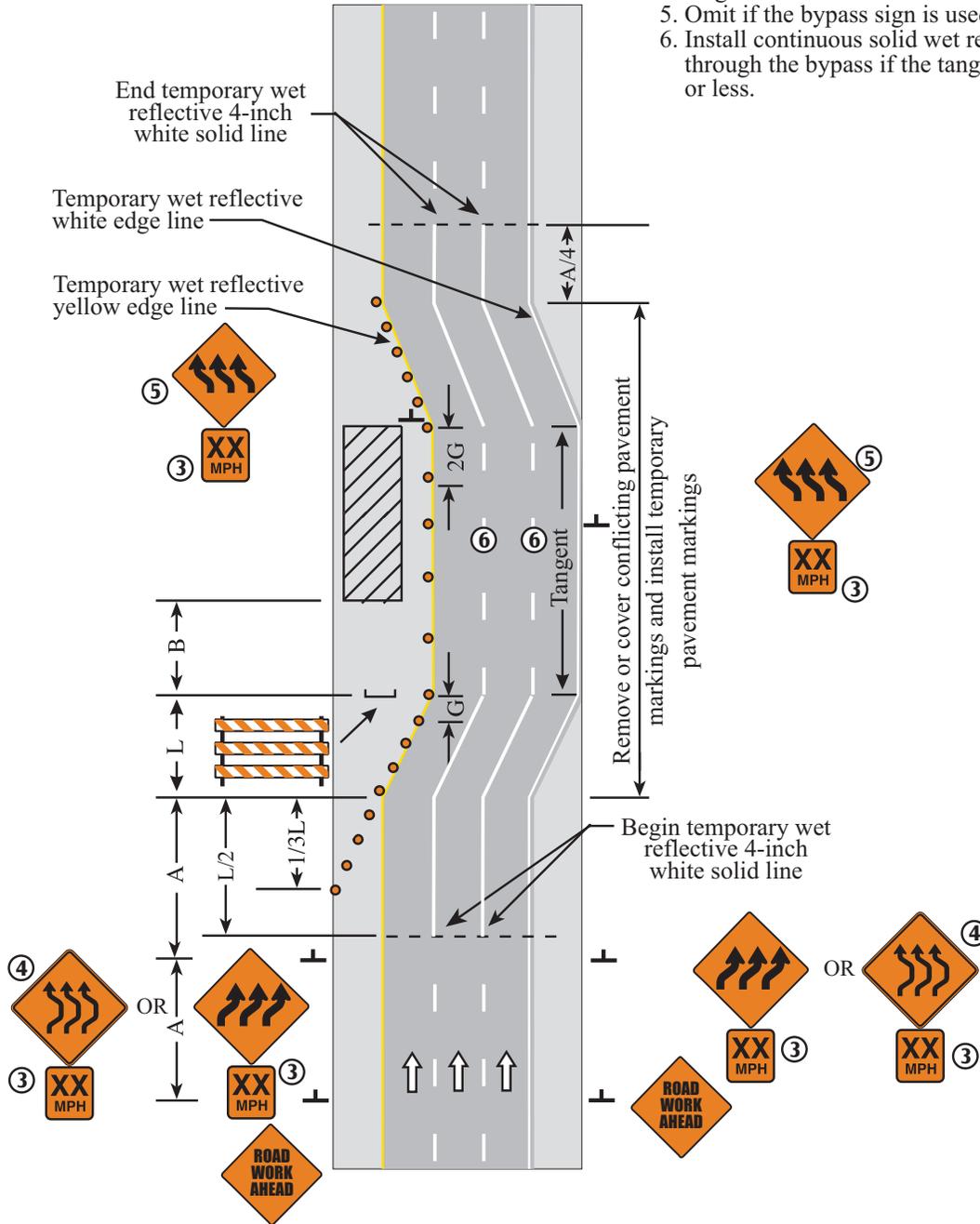
**LANE CLOSURE WITH SIGNALS  
TWO-LANE, TWO-WAY ROAD**

LONG TERM

LAYOUT 6J-13

**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. The minimum lane width shall be 10 feet.
3. The curve advisory speed will be determined by the Road Authority at the time of installation.
4. The bypass sign should be used when the tangent length is 600 feet or less.
5. Omit if the bypass sign is used.
6. Install continuous solid wet reflective lane lines through the bypass if the tangent is 600 feet or less.



**MULTIPLE LANE SHIFT  
MULTILANE DIVIDED ROAD**

LONG TERM

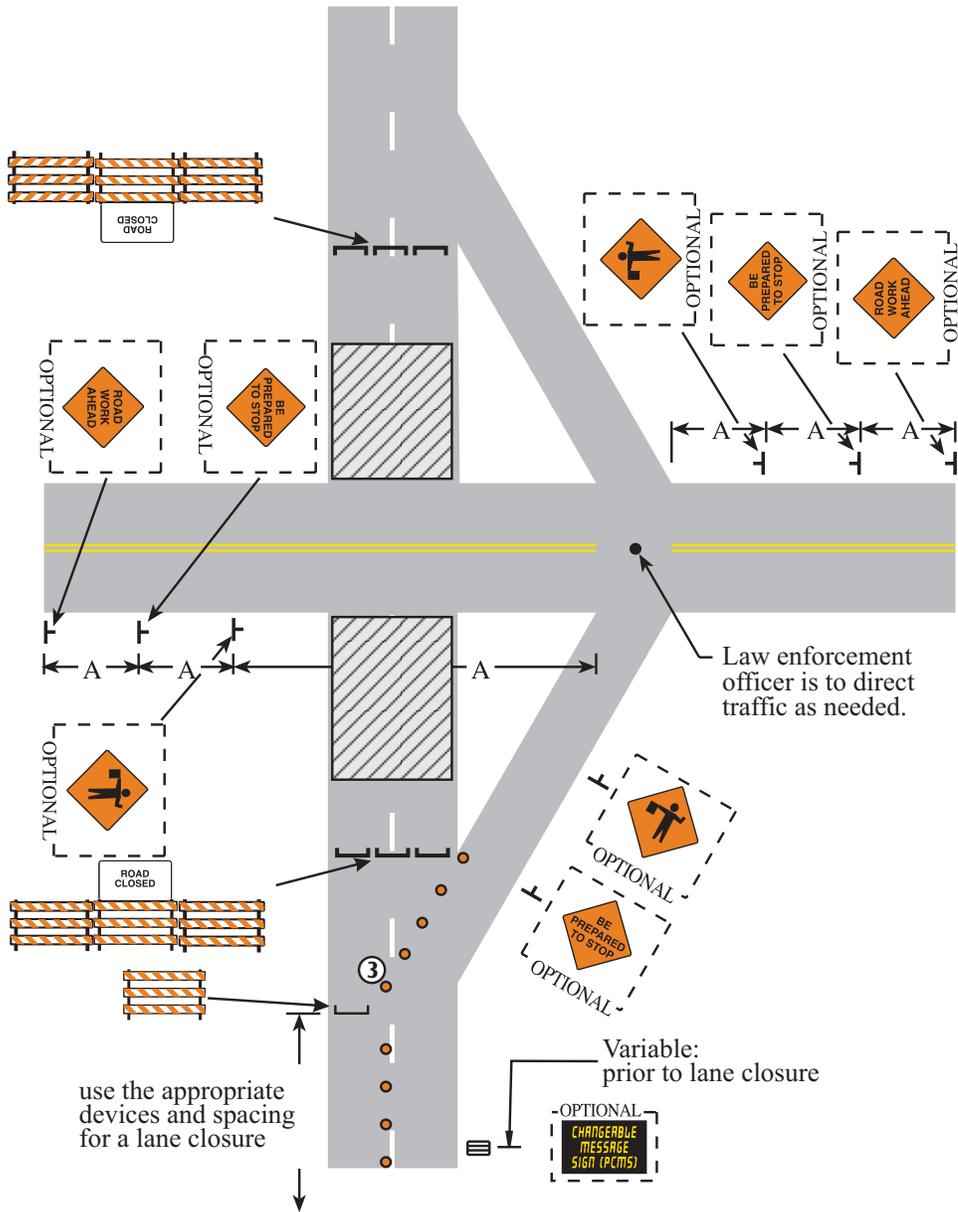
LAYOUT 6J-14

**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. The closed road volume should be below 800-1000 vehicles per hour.
3. Supplemental delineation such as chevrons, down arrows, etc. may be required in the bypass.

MN Rev. 3

MN Rev. 3



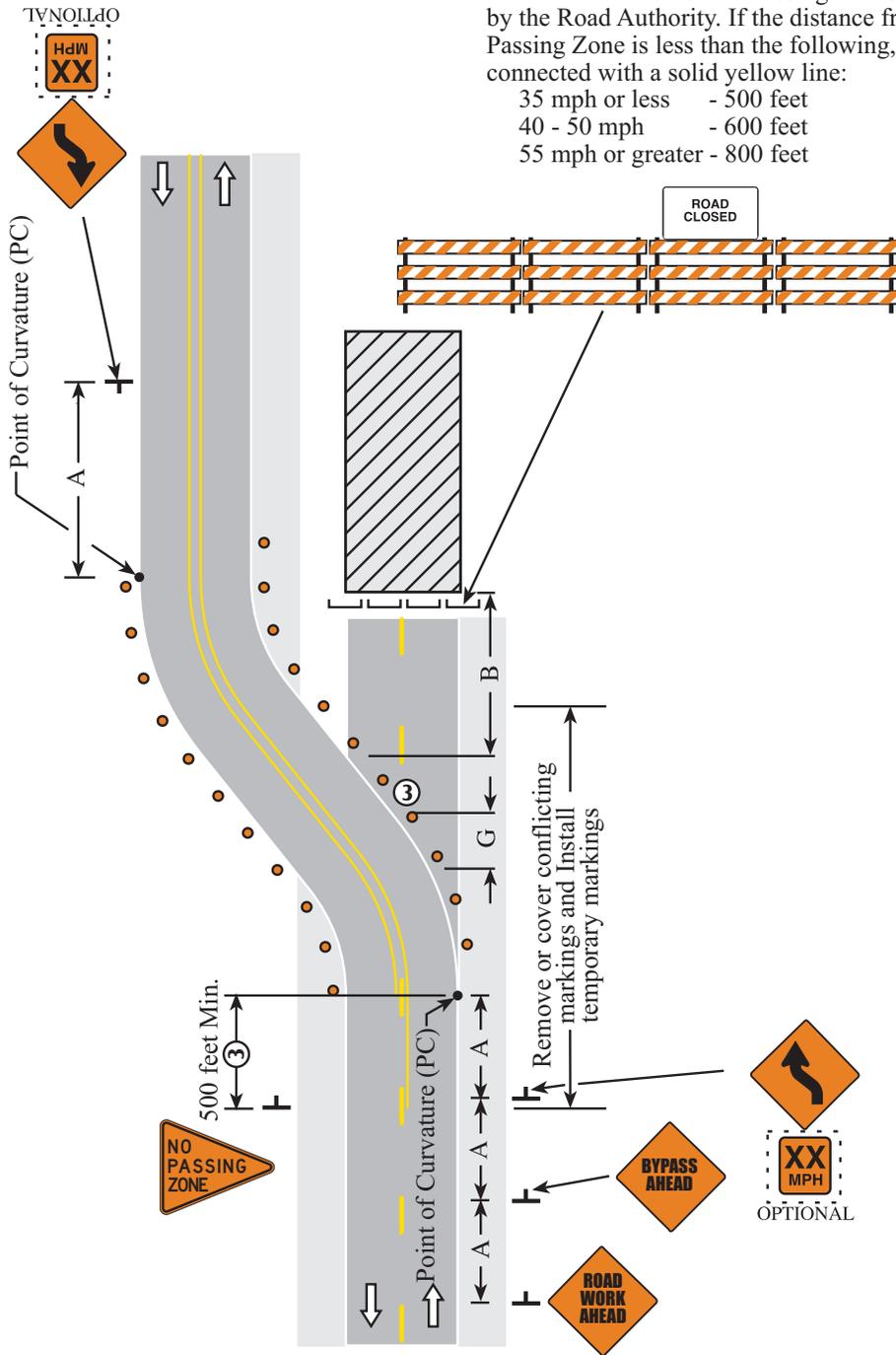
**ROAD CLOSURE AT INTERCHANGE**

SHORT TERM  
LONG TERM

LAYOUT 6J-15

**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. Typical traffic control is shown for one approach only.
3. Supplemental delineation (such as chevrons, down arrows, etc.) may be required on the bypass.
4. The exact location of No Passing Zones is to be determined by the Road Authority. If the distance from an in-place No Passing Zone is less than the following, the zones shall be connected with a solid yellow line:
  - 35 mph or less - 500 feet
  - 40 - 50 mph - 600 feet
  - 55 mph or greater - 800 feet



MN Rev. 3

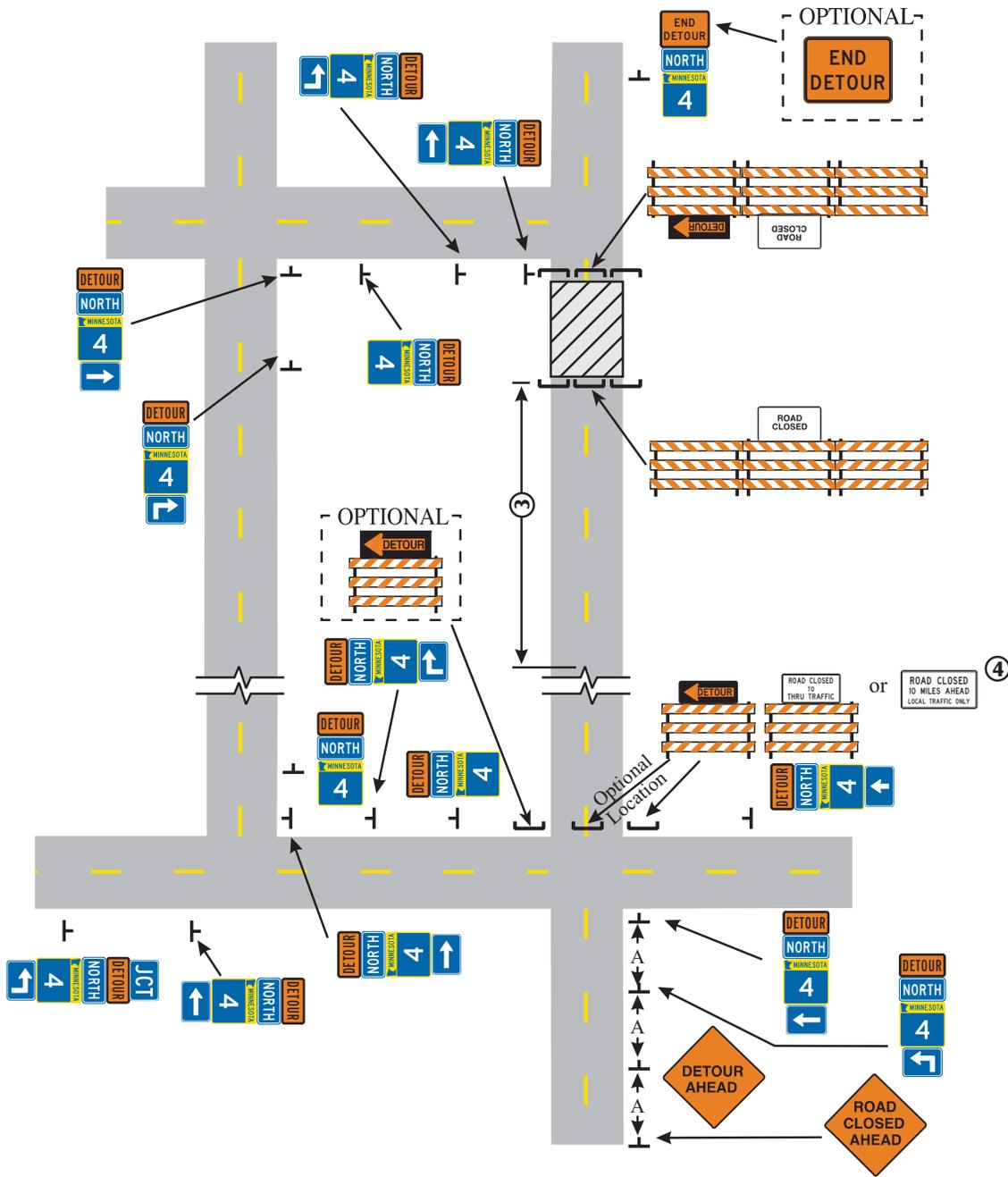
**ROAD CLOSURE WITH DIVERSION (BYPASS)  
TWO-LANE, TWO-WAY ROAD**

LONG TERM

LAYOUT 6J-16

**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. Detour signing is shown for one direction only. The other direction shall be similar.
3. See Long Term Layout 6J-20 for devices and spacing.
4. Use this sign when it is 2 miles or greater to the road closure.



MN Rev. 3

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MN Rev. 2

MN Rev. 3

MN Rev. 2

MN Rev. 3

**ROAD CLOSURE WITH DETOUR**

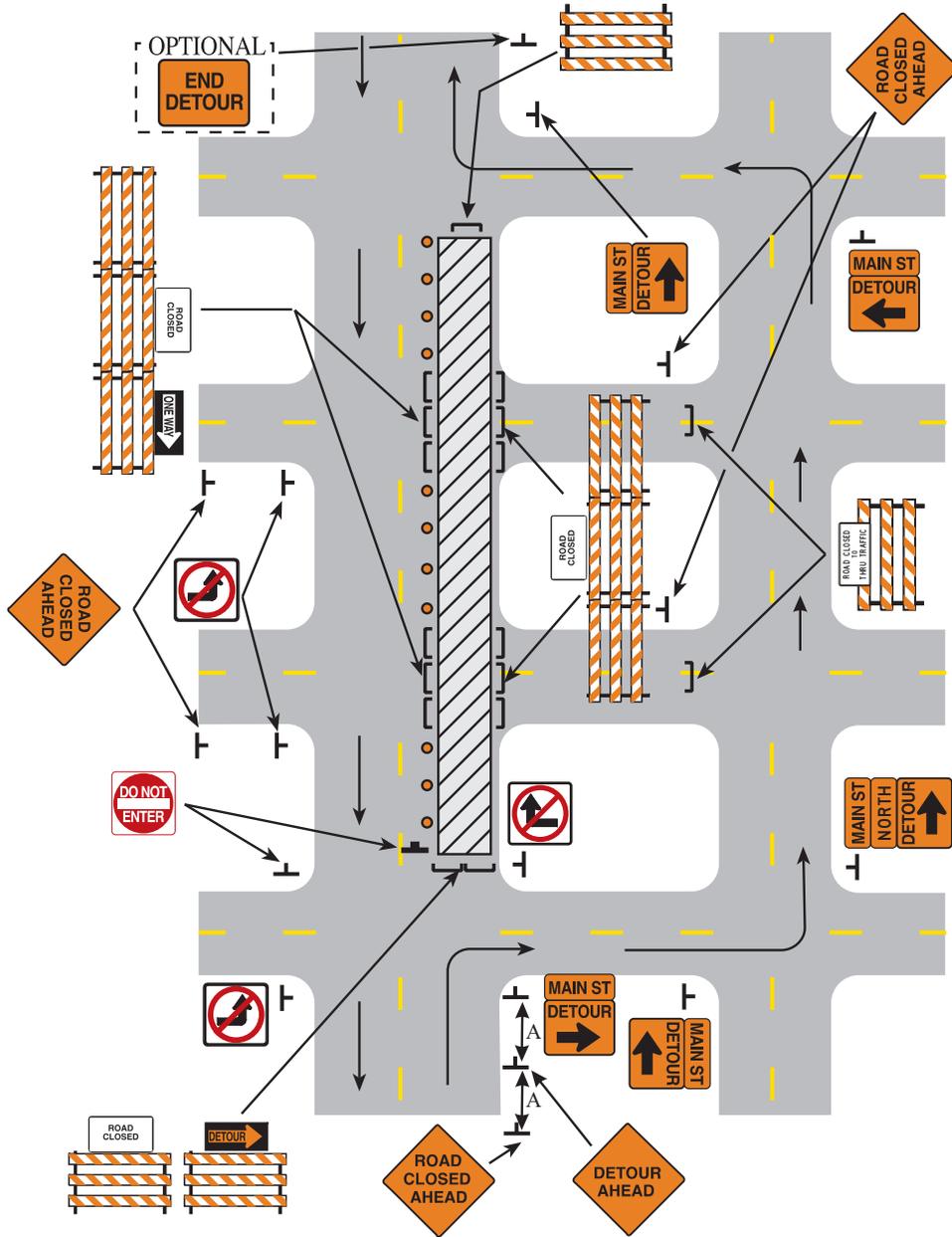
LONG TERM

LAYOUT 6J-17



**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. Additional "DO NOT ENTER" signs may be desirable at intersections with intervening streets.
3. For sidewalk and crosswalk closures, see Layouts 6K-24 and 6K-25.
4. Additional side street signs may be required.



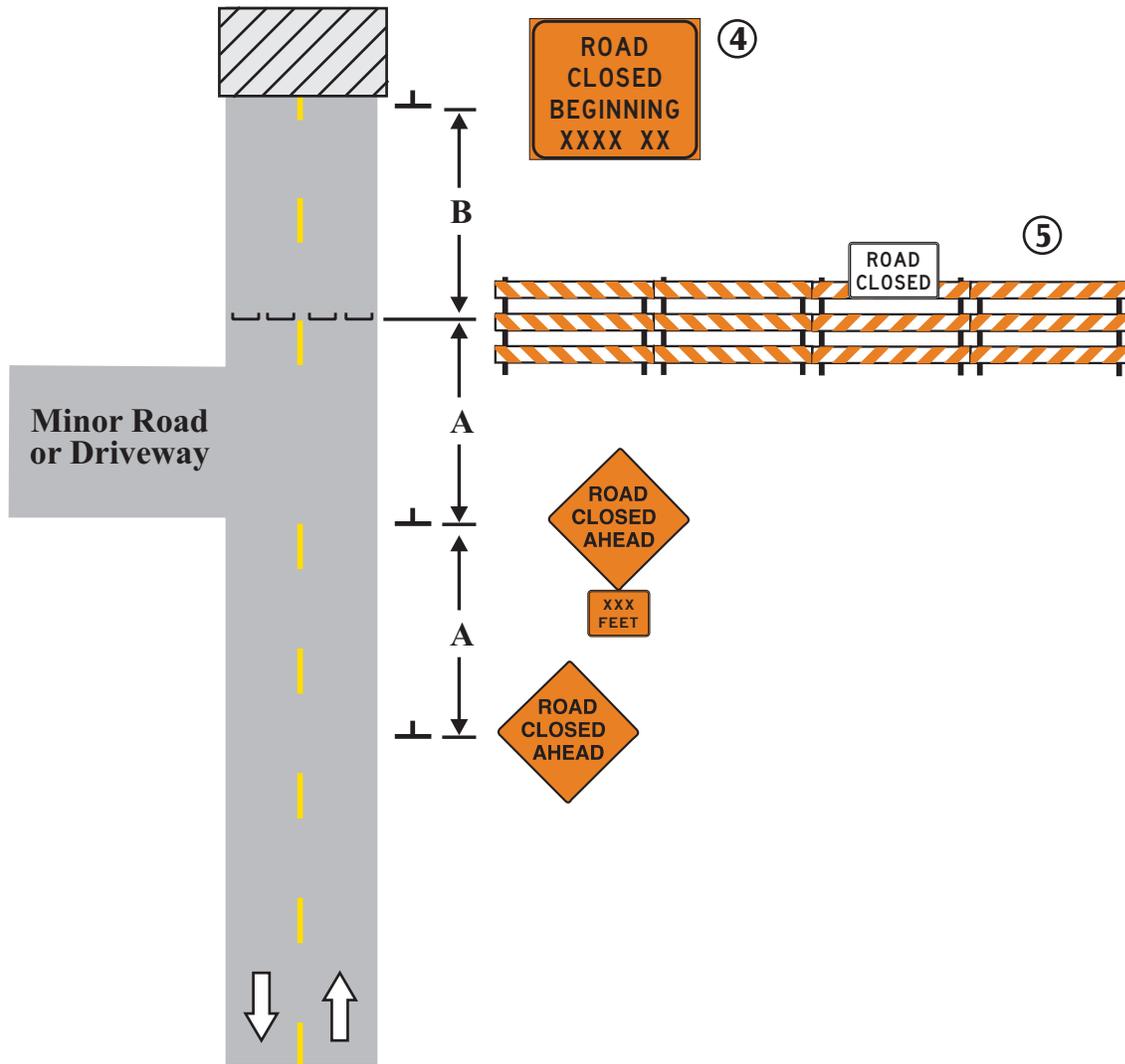
**DETOUR FOR ONE TRAVEL DIRECTION**

LONG TERM

LAYOUT 6J-19

**NOTES:**

1. See page iii for Temporary Traffic Control Distance Charts.
2. All devices are shown for one direction. Devices for the other direction should be similar.
3. The Road Authority will determine if a detour is required and specify the detour route.
4. Advance warning signs should be used seven days in advance of the closure.
5. Install at the last driveway or intersection beyond which there is no public access.



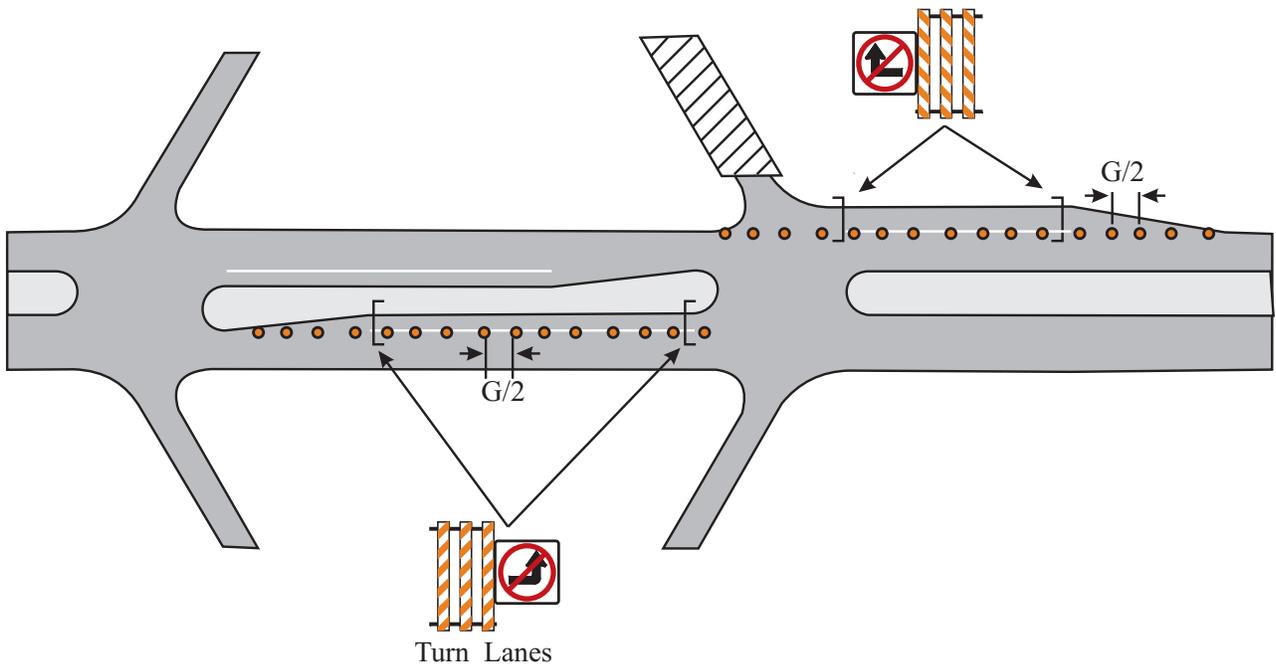
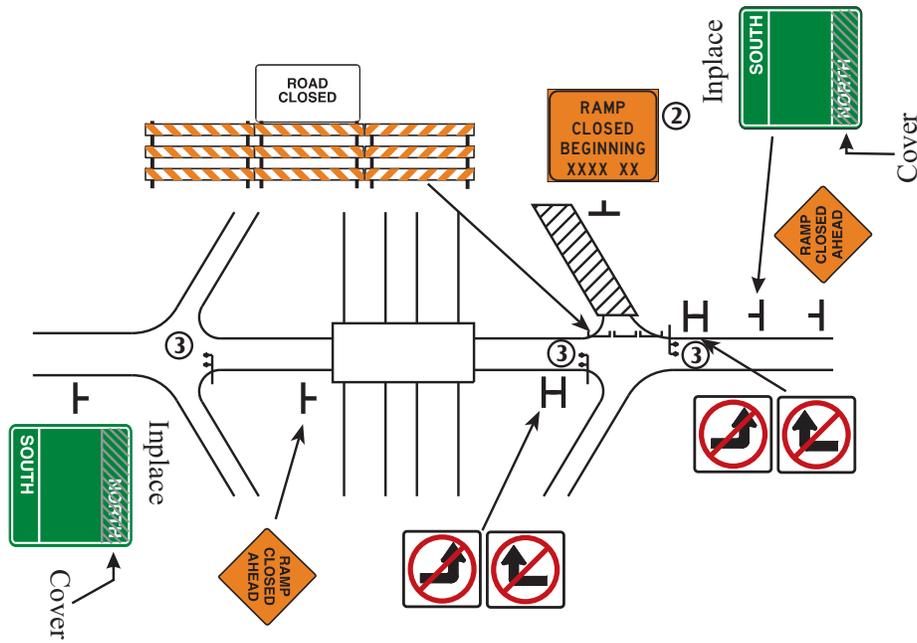
**TYPICAL SIGNING FOR ROAD CLOSURE**

LONG TERM

LAYOUT 6J-20

**NOTES:**

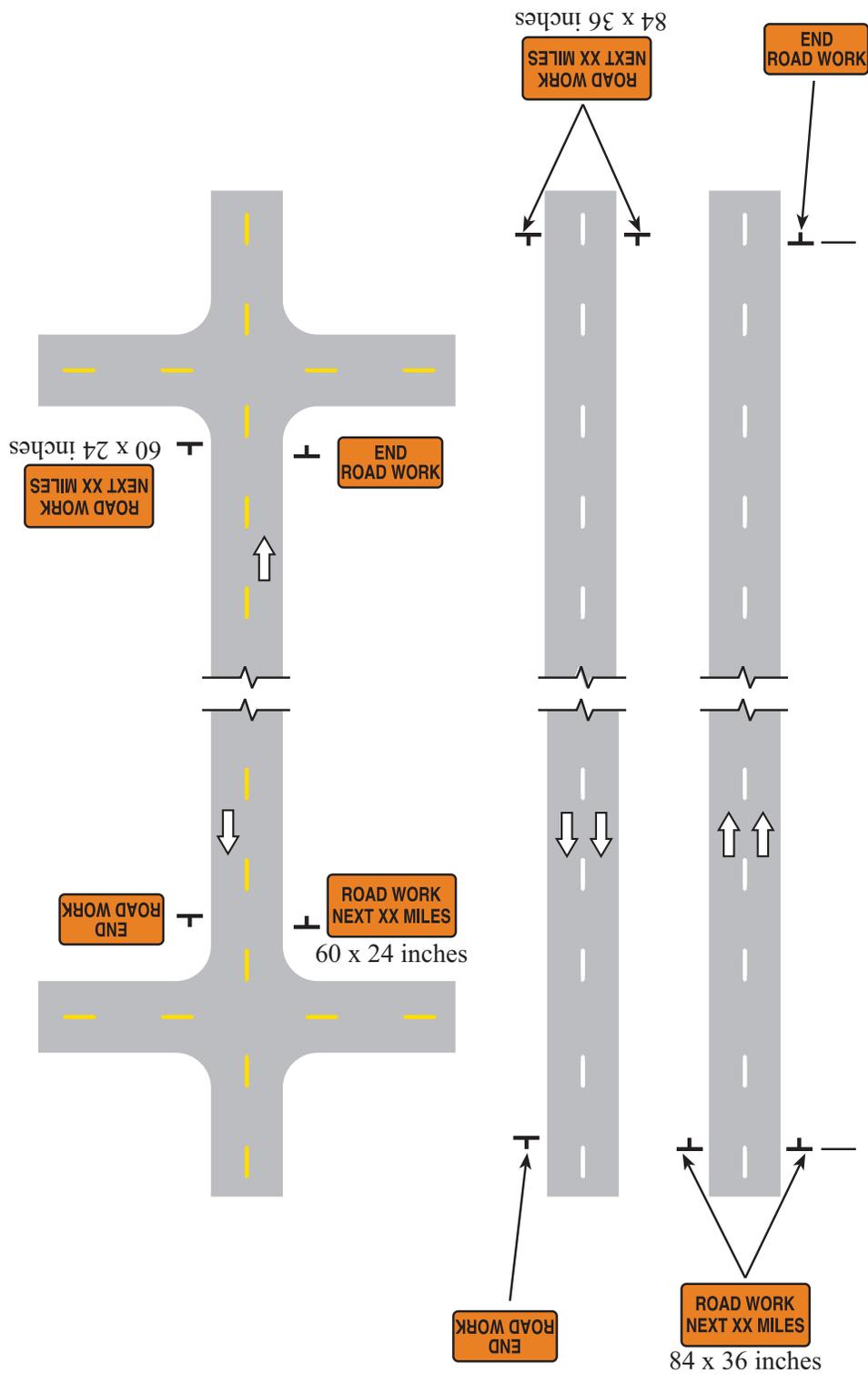
1. See page iii for Temporary Traffic Control Distance Charts.
2. Advance warning signs should be used seven days in advance of the closure.
3. Cover all directional signing for the closed ramp.



**ENTRANCE RAMP CLOSURES**

LONG TERM

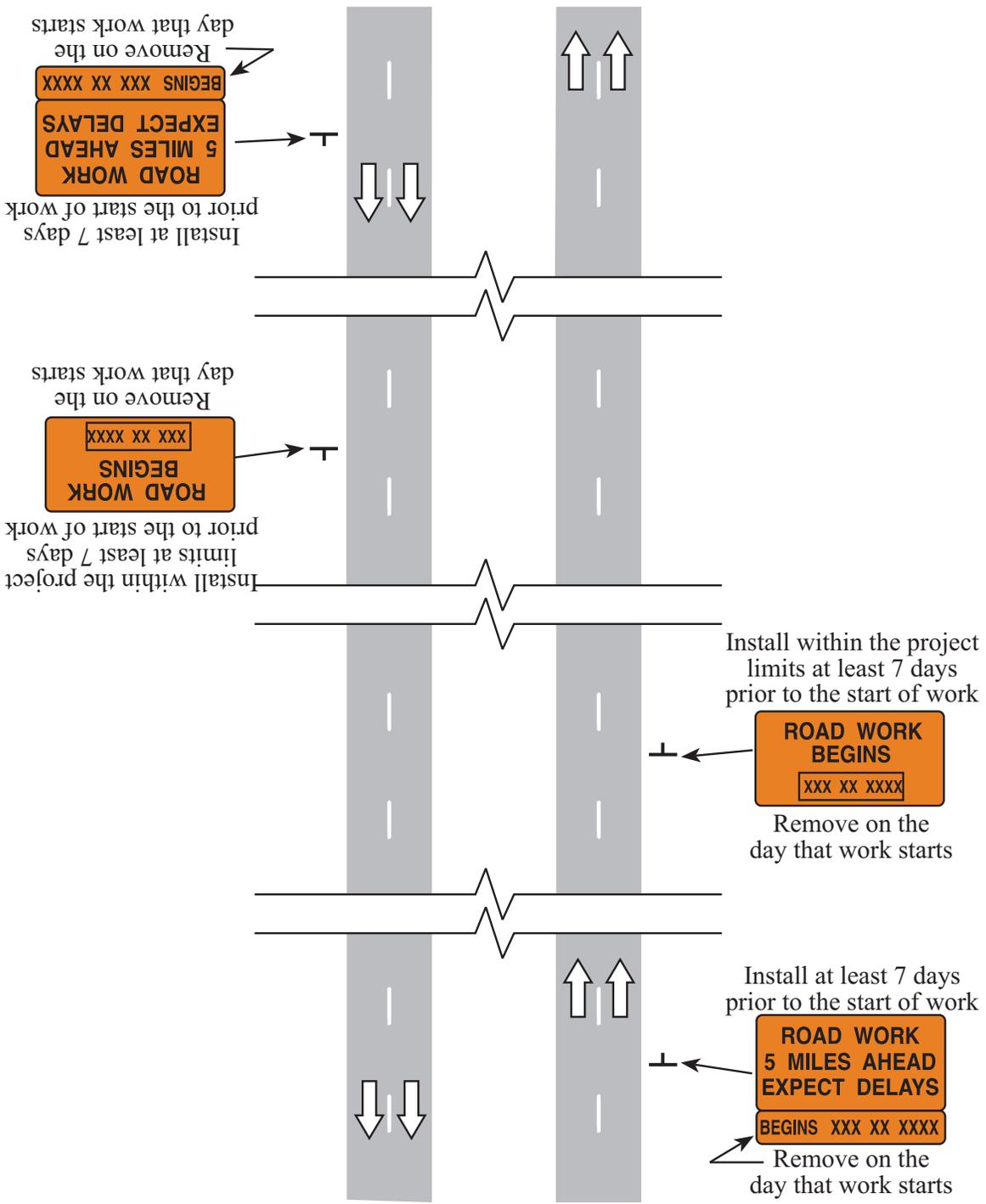
LAYOUT 6J-21



### TYPICAL TERMINI SIGNING

LONG TERM

LAYOUT 6J-22



## TYPICAL ADVANCE SIGNING

LONG TERM

LAYOUT 6J-23

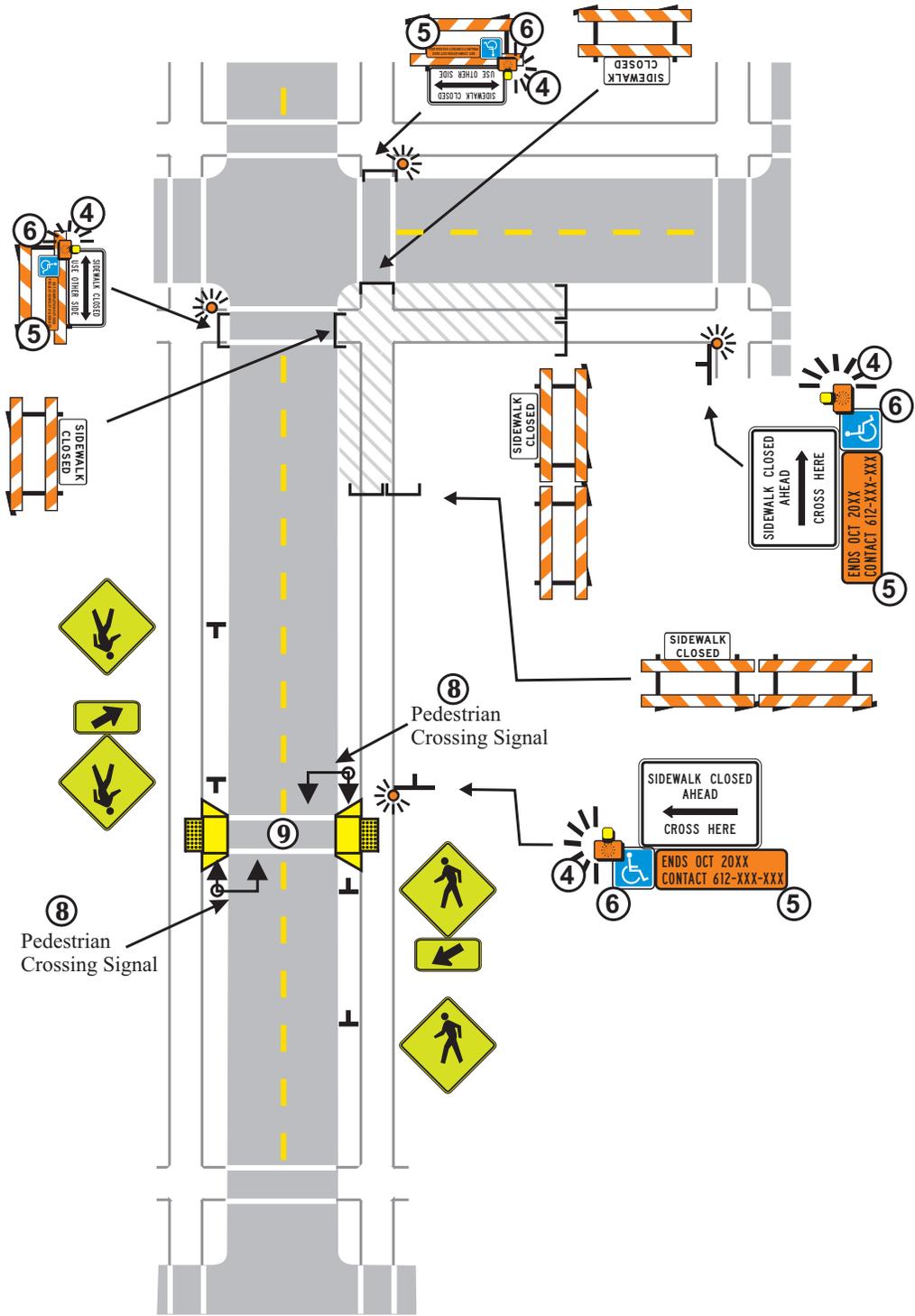
NOTES:

1. When crosswalks, sidewalks or other pedestrian facilities are blocked, closed or relocated, temporary facilities shall include accessibility features consistent with the features present in the existing pedestrian facility.
2. The examples show only key typical dimensions. Refer to the MnDOT "Temporary Pedestrian Access Route" (TPAR) website (<http://www.dot.state.mn.us/trafficeng/workzone/tpar.html>) for standards, guidance and options when blocking, closing, or relocating pedestrian facilities.
3. Only traffic control devices controlling pedestrian flows are shown. Other devices may be needed to control traffic on the streets.
4. An approved audible message device or tactile message should be provided for sight-impaired pedestrians. When used, a message device should provide a complete physical description of the temporary pedestrian detour including duration, length of (and/or distance to) the bypass, any restrictions or hazards and project information as listed in note 5 below. The number and location of devices should be determined for each project prior to starting work. Devices may be placed prior to sidewalk work to warn regular users of the planned work.
5. Typical sign message for a temporary pedestrian detour should include information such as the duration of the walkway restrictions (beginning and/or end dates) and a project contact number for 24/7 questions or reporting hazards.
6. The International Symbol of Accessibility should be displayed when any walkway through a work zone has been determined to be TPAR compliant. The Symbol of Accessibility shall not be displayed if persons with disabilities should not use the primary temporary pedestrian detour. The reason for the non-compliance should be posted and an alternate route should be posted when the primary temporary pedestrian detour is non-complaint to TPAR standards.
7. Conditions that are beyond recommended standards should be documented. A walkway is non-compliant if it is missing key ADA elements such as curb ramp(s), truncated domes, and detectable edging. Other restrictions or hazards may include insufficient width or pinch-point widths, traffic conflicts, steep grades, non-continuous railings, tripping hazards, or uneven/rough/soft surface conditions, etc.
8. Pedestrian traffic signal displays controlling closed crosswalks shall be covered. Temporary pedestrian signals should be considered when creating a new crossing location.
9. Curb marking shall be prohibited for a minimum of 30 feet in advance of the mid-block pedestrian crossing. Crosswalk marking shall be installed and conflicting marking removed or covered. Curb ramps with detectable warnings shall be provided to transition from the sidewalk to the crosswalk.
10. Pedestrian detour trailblazing signs should be used if the pedestrian detour is located someplace other than across the street from the sidewalk closure.

## CROSSWALK CLOSURES AND PEDESTRIAN DETOURS

LONG TERM

LAYOUT 6J-24a



## CROSSWALK CLOSURES AND PEDESTRIAN DETOURS

LONG TERM

LAYOUT 6J-24b

NOTES:

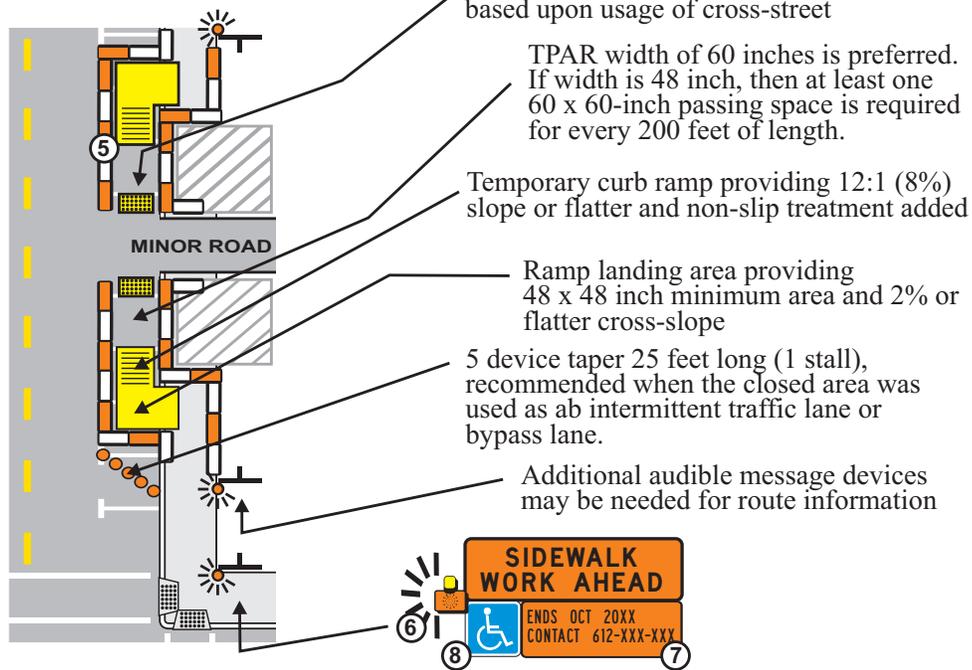
1. When crosswalks, sidewalks or other pedestrian facilities are blocked, closed or relocated, temporary facilities shall include accessibility features consistent with the features present in the existing pedestrian facility.
2. The examples show only key typical dimensions. Refer to the MnDOT "Temporary Pedestrian Access Route" (TPAR) website (<http://www.dot.state.mn.us/trafficeng/workzone/tpar.html>) for standards, guidance and options when blocking, closing, or relocating pedestrian facilities.
3. Where high speeds and/or high traffic volumes are anticipated, barrier should be used to separate the temporary pedestrian walkway from vehicular traffic. When used, barriers shall be installed as detailed in the MN MUTCD, Part 6F.
4. Only traffic control devices controlling pedestrian flows are shown. Other devices may be needed to control traffic on the streets.
5. When both sides of a temporary pedestrian bypass require channelizing devices, then the devices should be a similar type (railing system, barricade, or fencing system), excluding when TTC barrier (such as concrete barrier) is used to protect pedestrians from an open traffic lane.
6. An approved audible message device or tactile message should be provided for sight-impaired pedestrians. When used, a message device should provide a complete physical description of the temporary pedestrian by-pass including duration, length of (and/or distance to) the bypass, any restrictions or hazards and project information as listed in note 7 below. The message device(s) may also describe an alternate route. The number and location of devices should be determined for each project prior to starting work. Devices may be placed prior to sidewalk work to warn regular users of the planned work.
7. Typical sign message for a temporary pedestrian bypass should include information such as the duration of the walkway restrictions (beginning and/or end dates) and a project contact number for 24/7 questions or reporting hazards.
8. The International Symbol of Accessibility should be displayed when any walkway through a work zone has been determined to be TPAR compliant. The Symbol of Accessibility shall not be displayed if persons with disabilities should not enter the temporary pedestrian bypass. An alternate route should be posted when the temporary pedestrian bypass is non-complaint to TPAR standards.
9. Conditions that are beyond recommended standards should be documented. A walkway is non-compliant if it is missing key ADA elements such as curb ramp(s), truncated domes, and detectable edging. Other restrictions or hazards may include insufficient width or pinch-point widths, traffic conflicts, steep grades, non-continuous railings, tripping hazards, or uneven/rough/soft surface conditions, etc.
10. When a sidewalk is closed but workers are present who will provide assistance or directions to pedestrians, then the devices as shown are not required.

**SIDEWALK BYPASS**

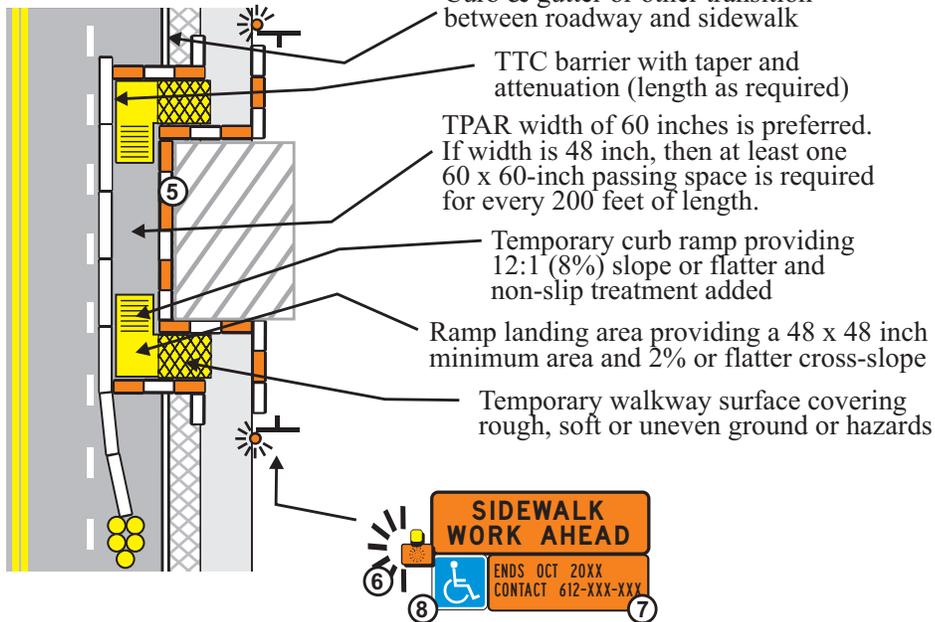
LONG TERM

LAYOUT 6J-25a

## LOW-SPEED ROADWAY



## HIGH-SPEED ROADWAY or LOW-SPEED MULTI-LANE



## SIDEWALK BYPASS

LONG TERM

LAYOUT 6J-25b



# Temporary Traffic Control Zone Layouts



# Field Manual

January, 2014

Standards &  
Specifications

Two-Lane  
Two-Way

Multi-Lane  
Undivided

Multi-Lane  
Divided

Miscellaneous  
Layouts

Quality  
Standards

Flagging  
Handbook

## K. The Field Manual

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This document as well as the Flagging Handbook and other documents are available on the Mn/DOT, Traffic Engineering website at: <http://www.dot.state.mn.us/trafficeng/>

## INTRODUCTION

This Field Manual is a section of the Part 6 of the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD). It has been reprinted as a separate document for use in field operations. This Field Manual contains the general Temporary Traffic Control (TTC) standards and the user should refer to the MN MUTCD - Part 6 for more details, and follow any TTC plans, specifications, and special provisions written for a specific project. When specific TTC plans for a specific operation are not available, any public or private agency whose work affects vehicular and pedestrian traffic should use this Field Manual to provide proper temporary traffic control (TTC).

The typical layouts contained in this manual do not cover all situations encountered. Because all situations differ, engineering judgment should be used to insure proper traffic control. The goal of the temporary traffic control zone is to provide for the safe and efficient movement of traffic around a location where the normal function of the roadway is temporarily suspended. To accomplish this, the respect of the driver must be earned by appropriate and prudent use of traffic control devices. When work is not in progress or the hazard no longer exists, the temporary traffic control devices shall be covered, turned away from traffic, or removed from the area.

This manual contains typical layouts for temporary traffic control zones ranging from mobile operations to zones which may remain in place overnight for up to three days. If the temporary traffic control zone is to remain in one place for more than three days or involves a detour, road closure or a situation where the typical layouts do not apply, the governing road authority's Traffic Engineering staff should be consulted and a project specific Temporary Traffic Control Plan prepared. Advance planning is necessary for a successful temporary traffic control zone. A checklist is included on page 6K-xii to assist you in planning your temporary traffic control zone.

Prior to starting work on any public roadway right-of-way, permission shall be obtained from the governing road authority. The use of any regulatory temporary traffic control device or sign shall be approved by the governing road authority prior to installation. To assist you on state highways, numbers for the Minnesota Department of Transportation are included in the back of this manual. You may wish to note the number of other road authorities on the NOTES page in the back of this book.

### DEFINITION OF SHALL, SHOULD, AND MAY

**Shall** - indicates a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device.

**Should** - indicates a statement of recommended practice, but not mandatory, in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate.

**May** - indicates a statement of practice that is a permissive condition and carries no requirement or recommendation.

## DEFINITIONS

**Activity Area** - that part of a TTC zone activity area where the work actually takes place. It consists of the work space, traffic space and one or more buffer spaces.

**Advance Warning Area** - that part of a TTC zone used to inform the motorist what to expect ahead. This area may contain anywhere from a single sign or a rotating/strobe light on a vehicle to a series of signs and the use of a portable changeable message sign (PCMS). The location of the beginning of the TTC zone is dependent on its visibility to motorists. Good visibility is achieved where the sight distance is sufficient to meet decision sight distance.

**Advance Warning Sign Spacing** - the distance between signs or between a sign and some other location or device with the TTC zone. It is determined by the posted speed limit. This will ensure that the motorist has sufficient time to read the signs and react accordingly. Typical Advance Warning Sign Spacings (A) are included in the TTC Distance Charts.

**Advisory Speed** - the recommended speed for all vehicles operating on a section of highway and based on the highway design, operating characteristics, and conditions. (See Layout 6K-77).

**Approach Sight Distance** - the distance which a motorist can visually identify a work space. The work space may be the flagger station, a lane closure, a slow moving or stopped vehicle, or any other situation which requires adjustments by the motorist.

**Attended Work Space** - a work space is considered to be attended when the TTC devices are reviewed for knock-downs or other needed adjustments on an hourly basis.

**Average Daily Traffic (ADT)** - the average 24-hour volume, being the total volume during a stated period divided by the number of days in that period.

**Buffer Space** - the space which provides a margin of safety for both the driver and the workers. It is important that the buffer space be free of equipment, workers, material and vehicles.

**Crashworthy** - is a characteristic of roadside devices that have been successfully crash tested in accordance with a national standard such as the National Cooperative Highway Research Program Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

**Decision Sight Distance** - the total distance traveled during the length of time required for a driver to:

- detect an unexpected or otherwise difficult-to-perceive information source or hazard in a roadway environment that may be visually cluttered,
- recognize the hazard or its potential threat,
- select an appropriate speed and path, and
- initiate and complete the required maneuver safely and efficiently.

The decision sight distance is used to determine the minimum advance warning distance to the furthest and/or single sign. When determining minimum sight distance to flaggers and mobile operations, these distances also apply. The required Decision Sight Distances (**D**) are included in the TTC Distance Charts.

**Divided Road** - a highway or two roadways where opposing traffic is separated by a median (ditch, barrier, curbing, etc.), and the median is generally wide enough to place TTC devices. Temporary traffic control for divided multi-lane roads may be also used for one-way roadways.

**Downstream Taper** - the taper at the end of the activity area which guides traffic back into its original lane. When used, this taper is a minimum length of approximately 100 feet with a 20-foot spacing between channelizing devices.

**Duration** - the length of time any work operation occupies a specific location or causes a traffic obstruction without changing the location. This time is measured from the first disruption to traffic until the total clearing of the area. The following durations are defined in overlapping intervals since TTC layouts for longer durations may always be used for shorter durations, especially when roadway attributes such as traffic volume and speed, and the work space location may warrant higher levels of traffic control.

- **Mobile** - when an operation is continuously moving or stopped in one location for periods of 15 minutes or less. The traffic control devices are typically vehicle-mounted. The work area should change by at least the decision sight distance for it to be considered a change in location.
- **Short Duration** - when an operation stays in one location during daylight conditions from 15 minutes to one hour, such that minimal TTC devices are deployed.
- **Short Term** - when an operation stays in one location during daylight conditions from 15 minutes to twelve hours, such that advance signing and channelizing devices are required.
- **Intermediate Term/Night** - when an operation stays in one location during daylight conditions from 15 minutes to no more than 3 days, or stays in one location during hours of darkness. Advance signing and larger channelizing devices (Type B) are required.
- **Long Term** - when an operation stays in one location for more than 3 days. A project specific Traffic Control Plan is typically required.

**Engineering Judgment** - the evaluation of available pertinent information, and the application of appropriate principles, standards, guidance, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment shall be exercised by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. Documentation of engineering judgment is not required.

**Expressway** - any multi-lane, divided highway for through traffic with partial control of access and generally with at-grade intersections.

**Following Distance** - the distance in a mobile operation between the shadow vehicle and the work vehicle. It is used to provide advance warning to traffic that some type of work is being done within the traffic lane. Traffic will have to change lanes, slow down and wait for a safe time to pass, or adjust their position within the lane to allow for a narrower traffic lane. The shadow vehicle shall be equipped with appropriate advance warning signing. Typical Following Distances (**F**) are included in the TTC Distance Charts. This distance is a range with a minimum of the recommended distance between advance warning signs (**A**), and a maximum of the decision sight distance. These distances are dependent upon the roadway and traffic conditions. Engineering judgment should be used when selecting distances for specific operations.

**Freeway** - any divided highway with full control of access (i.e. has ramps and no at-grade intersections).

**High Speed Road** - a roadway where the posted speed limit is 45 miles per hour or higher.

**Lane Closure** - a closure of one or more lanes of the roadway to traffic. Work operations that restrict adjacent lane width should consider various lane closure alternatives depending upon volume and speeds on the roadway.

**Lane Width** - for traffic control purposes, a minimum lane width of 10 feet shall be provided.

**Lateral Buffer Space** - the space that separates the traffic space from the work space. It is typically the extra space provided between traffic and workers, excavations, pavement edge drop-offs, or an opposing lane of traffic. Traffic lanes may be closed to provide for lateral buffer space. See the Longitudinal Drop-off Guidelines (pages 6K-xxi thru 6K-xxiii) of this manual for more information.

**Longitudinal Buffer Space** - the distance between the transition area and the work space. If a driver does not see the advance warning or fails to negotiate the transition area, a buffer space provides room to stop before the work space. Typical Longitudinal Buffer Spaces (**B**) are included in the TTC Distance Charts.

**Low Speed Road** - a roadway where the posted speed limit is 40 miles per hour or lower.

**Merging Taper** - the taper used on a multi-lane road to close a lane and combine its traffic from that of the adjacent lane. Its length is dependent on the posted speed of the roadway. Higher speeds require a longer distance for traffic to merge lanes. Typical Merging Tapers (**L**) are included in the TTC Distance Charts.

**Mobile Buffer Space** - the distance in a mobile operation between the shadow vehicle and the work vehicle. This distance is dependent on whether the shadow vehicle is being used as an advance warning device or as a blocking/protection device for the work vehicle.

**Motorist** - an operator of a motorized vehicle intended to be used on a roadway.

**Multi-Lane Road** - a roadway where two or more lanes of traffic travel in the same direction. A multi-lane roadway may be classified as either undivided or divided.

**Occupied Work Space** - a work space is considered to be occupied when workers are present within the work space. TTC devices should continuously be reviewed by workers and adjustments made as needed.

**Off Shoulder** - a work space located primarily off of the shoulder, or which causes little or no restrictions on the use of the shoulder. This work space should have little or no interference with traffic such that traffic speeds generally are not reduced.

**Portable Changeable Message Sign (PCMS)** - a sign either trailer-mounted or vehicle-mounted that is capable of displaying more than one message, changeable by remote or automatic control.

**Posted Speed Limit** - the speed limit determined by law and shown on Speed Limit signs. It is used in the charts to determine the spacings of TTC devices and the lengths of various tapers on the TTC Layouts. Typical Posted Speed Limits (**S**) are included in the TTC Distance Charts.

**Protection Vehicle** - the vehicle that is placed in advance of the work space and equipment to block errant motorists from entering the work space.

**Road, Roadway** - That portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the sidewalk, berm, or shoulder even though such sidewalk, berm, or shoulder is used by persons riding bicycles or other human-powered vehicles.

**Roll Ahead Distance** - the recommended minimum distance between a protection vehicle and the work space. A protection vehicle may be used in a mobile operation to provide extra safety for the workers. Typical Roll Ahead Distances (**R**) are included in the TTC Distance Charts.

**Roundabout** - a circular intersection with yield at entry, which permits a vehicle on the circulatory roadway to proceed, and with deflection of the approaching vehicle counter-clockwise around a circular island.

**Rural Highway** - a highway where traffic is normally characterized by lower volume, higher speed, fewer turning conflicts and fewer conflicts with pedestrians.

**Shadow Vehicle** - the vehicle placed behind the work space in a mobile operation to provide advance warning to motorists. Because mobile operations generally have all advance warning signing mounted on vehicles, the spacing between vehicles should be the Following Distance (F) as included in the TTC Distance Charts.

**Shifting Taper** - the taper used to move traffic from the traffic lane onto a by-pass or shoulder. This traffic maneuver generally requires half the distance than a merging taper. See the TTC Distance Charts for the length of a shifting taper called  $L/2$ .

**Shoulder Closure** - a closure of the roadway shoulder for work operations. The shoulder then becomes unusable by traffic for vehicle maneuvers or break-downs. TTC layouts for work operations using or on a shoulder are dependent on the type of shoulder usage and duration.

**Shoulder Taper** - the taper used to close the shoulder off to traffic so that shoulder work can be done or equipment can be placed on the shoulder. Since this taper is used to guide errant traffic back to its normal lane path, it does not require a full merge distance. The taper length is reduced to one-third of a merging taper length. See the TTC Distance Charts for the length of a shoulder closure taper called  $L/3$ .

**Temporary Pedestrian Access Route (TPAR)** - a temporary, continuous and unobstructed walkway within a pedestrian circulation path that provides accessibility.

**Temporary Traffic Control (TTC) Plan** - a plan describing the traffic controls to be used for facilitating vehicle and pedestrian movements through a temporary traffic control zone.

**Temporary Traffic Control (TTC) Zone** - an area of a highway where road user conditions are changed because of a work zone or incident by the use of temporary traffic control devices, flaggers, uniformed law enforcement officers, or other authorized personnel. See Figures 6K-6 and 6K-7, Component Parts of a Temporary Traffic Control Zone.

**Termination Area** - that part of a TTC zone located beyond the work space which guides traffic back into its normal traffic path. A longitudinal buffer space may be used between the end of the work space and the beginning of the downstream taper.

**Traffic Control Device** - a sign, signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or shared-use path by authority of a public agency having jurisdiction.

**Traffic Space** - that part of the roadway open to traffic that is next to the activity area. Traffic routing is provided with channelizing devices of various sizes and shapes. For a description of the various types of channelizing devices and their general uses, see the Temporary Traffic Control Devices Section (page 6K-xiii) of this manual.

**Transition Area** - that part of the TTC zone that moves the traffic from its normal path or lane into the traffic space. This movement of traffic is done through the use of channelizing devices and directional signing placed in various types of tapers.

**Turn Lane Closure** - the closure of a right or left turn lane for work operations. Signing in the TTC zone shall provide adequate warning to the motorists and provide an alternative turning maneuver. Layouts from the various roadway types should be reviewed for the best alternate depending upon roadway intersection design, traffic control (stop, yield, signals, etc.), speed limit and volume.

**Two-Lane, Two-Way Road** - a roadway consisting of two opposing lanes of undivided traffic.

**Two-Way Left Turn Lane** - that part of the roadway that has a continuous two-way left turn lane located between the opposing lanes of traffic. This design variation may be found on either two-lane, two-way roads or multi-lane roads.

**Two Way Taper** - the taper used on two-lane, two-way road to change the road into a single lane of two-way traffic. It is primarily used for flagging operations and other traffic control situations. It is typically 50 feet in length and contains five equally spaced channelizing devices.

**Undivided Road** - a roadway where opposing traffic lanes have no physical separation barriers except pavement markings (where required).

**Urban Street** - a type of street normally characterized by relatively low speed, wide ranges in traffic volume, narrower roadway lanes, frequent intersections, significant pedestrian traffic, and more roadside obstacles.

**Volume** - the number of vehicles passing a given point on the roadway or, the Average Daily Traffic (ADT).

**Work Space** - that part of the TTC zone closed to traffic and set aside for workers, equipment and materials. The space requirements for a specific TTC Zone will determine the type of TTC layout that is appropriate for the project. The layout will specify the appropriate sign locations, flagger stations and tapers depending on the type of work space.

**Work Zone Speed Limits** - a regulatory speed limit in a temporary traffic control zone. This speed limit requires proper documentation to approve and install. See *Work Zone Speed Limit Guidelines* at the following website for details:

<http://www.dot.state.mn.us/speed/pdf/WZSpeedLimitGuideline.pdf>

# **TEMPORARY TRAFFIC CONTROL GENERAL GUIDELINES**

## **INDIVIDUAL RESPONSIBILITIES**

Before beginning work, you should familiarize yourself with this manual, the definitions, principles and the following General Responsibilities. Qualified individuals who have adequate training in temporary traffic control and have a basic understanding of the MN MUTCD should supervise the selection, placement and maintenance of traffic control devices in temporary traffic control zones.

## **GENERAL RESPONSIBILITIES**

Except where otherwise specified any public or private agency performing work within the right-of-way of streets or highways open to public travel shall be responsible for:

- supplying, installing, and maintaining all necessary traffic control devices outlined in this manual and as stipulated by the governing road authority to protect the work space and safely direct traffic around the temporary traffic control zone.
- supplying their own flagger(s) when required.
- informing occupants of abutting properties, either orally or by written notice, of parking prohibitions or access limitations.
- notifying the governing road authority when existing traffic signs need to be removed or relocated or any regulatory sign must be installed for construction or maintenance work.
- replacing or reimbursing the governing road authority for any damage to or loss of existing traffic signs.
- keeping all traffic control devices clean and in proper position to ensure optimum effectiveness.
- removing traffic control equipment when it is no longer required or appropriate.
- keeping proper records of traffic control that contain starting and ending times, location, names of personnel, traffic controls used, etc. The method of record keeping may vary from a log entry to a complete Traffic Control Plan.

## **PERMISSION TO WORK WITHIN THE RIGHT-OF-WAY**

Prior to starting work permission must be obtained from the governing road authority. All road work must be coordinated to protect the public's interest.

The governing road authority may limit the hours of work. Peak traffic periods vary by hour or day of week and all work should be scheduled during non-peak hours.

When working in or near an intersection with a traffic control signal system, the road authority with jurisdiction over the signal should be contacted to ensure proper operation of the signal while the work is in progress.

## **SELECTING AN APPROPRIATE TEMPORARY TRAFFIC CONTROL LAYOUT**

This Field Manual, which is Temporary Traffic Control Zone Layouts, Part 6K of the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD), has been organized such that field personnel should easily be able to determine the proper temporary traffic control layout for the work zone they need. The layouts are divided primarily by the type of roadway and type of work space. The roadway designations are:

Two-Lane, Two-Way Roads (with and without continuous left-turn lanes)

These roads are further divided by traffic volume (low, intermediate, high),

Multi-Lane Undivided Roads (with and without continuous left-turn lanes),

and

Multi-Lane Divided Roads

After determining the type of roadway upon which the work space will be located, the type of work space needs to be determined. The work space is the area within the right-of-way that will be closed from normal usage. It includes all the area needed by support equipment, materials, workers and vehicles. It may require the closing of a roadway lane(s), the shoulder of the road, or a turn lane within an intersection. The work space may even be completely off the roadway shoulder such as on side-slopes or along sidewalks. The layouts are listed by the typical work space areas.

Within some layouts, there are TTC options that may be omitted based upon several factors. These may include: duration of the operation, volume of the road, speed limit on the road, and departmental (or company) policy. TTC supervisors should be fully aware of the variations in the layouts due to the various factors, and when and how the layouts may be modified. See the Checklist for Establishing a TTC Zone on page 6K-xii.

All distances shown on the layouts and charts are approximate. In general, all chart distances vary based upon the posted speed limit. Adjustments in these distances should be made based on traffic entry points and decision sight distance. As stated previously, not all situations could be addressed and engineering judgment should be exercised. Features from several layouts may need to be combined together for one project. For example, work in or near an intersection may require a layout for a lane closure, a layout for work in the intersection and a layout for a crosswalk closure.

In some situations, a TTC layout usually required for a longer duration may be needed due to the nature of the work or the traffic. For example, a patching a pothole on a high-volume, high-speed freeway may require less than 15 minutes of time (mobile operation) but a stationary lane closure may be needed because of the high volumes of traffic.

Additional layouts have been placed in the manual for unique operations and special signing conditions. These layouts may have special restrictions and guidelines contained within their notes.

## ENHANCEMENT OF THE TEMPORARY TRAFFIC CONTROL LAYOUTS

To improve safety, typical layouts contained in this manual may need to be modified to fit more complex roadway conditions or operations. When conditions are more complex, modifications may incorporate devices and practices from the following list:

1. Additional Devices:
  - a. more signs or enhanced signs (using LEDs, flags, beacons, etc.)
  - b. “flashing” arrow board
  - c. more channelizing devices at close spacing
  - d. temporary raised pavement markers
  - e. high-level warning devices
  - f. portable changeable message signs
  - g. portable traffic signals
  - h. portable barriers
  - i. impact attenuator crash cushions
  - j. glare screens
  - k. rumble strips
  - l. more delineation
2. Upgrading of Devices
  - a. a complete set of standard pavement markings in high hazard areas
  - b. brighter and/or wider pavement markings
  - c. larger and/or brighter signs
  - d. more visible channelizing devices with greater conspicuity
  - e. temporary traffic barriers in place of channelizing devices
3. Improved Geometrics at Diversions or Crossovers
4. Increased Distances
  - a. longer advance warning area
  - b. longer tapers
5. Lighting
  - a. temporary roadway lighting
  - b. steady burn lights used with channelizing devices
  - c. flashing lights for isolated hazards
  - d. illuminated signs
  - e. work space lighting
6. Work zone speed limits

See *Work Zone Speed Limit Guidelines* at the following website for details:  
<http://www.dot.state.mn.us/speed/pdf/WZSpeedLimitGuideline.pdf>

## **INSTALLING THE TEMPORARY TRAFFIC CONTROL ZONE**

Traffic control devices shall be installed in the order that drivers will see them, starting with the sign or device that is furthest from the work space. If traffic in both directions will be affected, such as work in the center lanes, the devices may be placed in both directions at the same time. When one direction of traffic will be directed into the opposing lanes of traffic, all traffic controls for the opposing traffic should be installed first.

The devices should be removed as soon as the work is completed and are no longer needed. Devices should be removed in the opposite order from which they were installed. Devices which the driver sees last should be removed first.

A clear lane at least 10 feet wide shall be maintained at all times. After the temporary traffic control zone is in place, it should be inspected by driving through the zone. Motorists' actions and reactions should be noted and if any problems are encountered, they should be quickly corrected. Any modifications to the Traffic Control Plan or standard layouts and the reasons for the modifications should be documented.

During the life of a temporary traffic control zone, maintenance of devices is frequently needed. On short term operations, vehicles may knock over cones which then need to be placed upright. If problems are encountered, they should be corrected immediately and documented.

## CHECKLIST FOR ESTABLISHING A TEMPORARY TRAFFIC CONTROL ZONE

COMPLETED	ITEM
<input type="checkbox"/>	Obtain permit from governing road authority.
<input type="checkbox"/>	Determine the type of roadway
<input type="checkbox"/>	Determine the type of work space
<input type="checkbox"/>	Determine the duration of work.
<input type="checkbox"/>	Select hours of work to avoid peak periods.
<input type="checkbox"/>	Select the appropriate layout(s) using type of roadway, type of work, duration, traffic volume, speed and impact on pedestrian and bicycle travel. (See the appropriate <b>Index Chart</b> at the start of each section)
<input type="checkbox"/>	Determine any modifications to typical layout(s). (See the <b>Enhancement of the TTC Layouts</b> on page 6K-x)
<input type="checkbox"/>	Check decision sight distance.
<input type="checkbox"/>	Advance signing distance.
<input type="checkbox"/>	If possible, maintain access to intersections, parking areas, and driveways (public and private).
<input type="checkbox"/>	Allow for buffer space free of obstructions.
<input type="checkbox"/>	Contact the proper road authority if the work zone interferes with normal signal operation in the area.
<input type="checkbox"/>	Check the condition of devices. (See the <b>Quality Standards</b> on pages 6K-91 thru 6K-106)
<input type="checkbox"/>	Install devices beginning with the first device the driver will see.
<input type="checkbox"/>	Conduct a drive thru to check for problems. (See the <b>Enhancement of the TTC Layouts</b> on page 6K-x)
<input type="checkbox"/>	Document temporary traffic control zone, problems and major modifications to the layouts.
<input type="checkbox"/>	Traffic should be observed to see if the taper is working correctly.
<input type="checkbox"/>	Remove the devices as soon as work is completed, beginning with the last device seen by the motorist.

Figure 6K-1

## **TEMPORARY TRAFFIC CONTROL DEVICES**

### **Channelizing Devices**

The function of channelizing devices is to delineate a desired vehicle path, mark specific hazards on or near the roadway, separate opposing traffic flows and partially or totally close the roadway. See the "Longitudinal Drop-off Guidelines" on pages 6K-xxi thru 6K-xxiii for the use of channelizing devices adjacent to shoulder edge drop-offs or uneven lanes.

Channelizing devices include cones, drums, barricades, temporary raised islands and various kinds of markers. The devices are broken into two type classifications based upon the nighttime visibility of the device. Their visibility is determined upon the total amount of reflective area of the device. Devices with less than 270 sq. in. are classified as Type A Channelizing devices and devices with more than 270 sq. in. of reflective area are Type B devices. Type A channelizing devices may be used in attended TTC zones and Type B channelizing devices shall be used if the TTC zone will be left unattended overnight or be in place longer than 12 hours. Where a Type B channelizing device, such as a drum, causes an isolated sight restriction, or is too wide for a space, a 42-inch tall weighted channelizer may be substituted. This substitution may be used in unattended overnight conditions at sight or space restricted locations as approved by the road authority. When used, the spacing of the devices should be reduced by up to 50 percent. Figure 6K-11 shows a breakdown of devices by Channelizer Type (drawn to approximate scale). See the MN MUTCD, Part 6F for additional details on application restrictions.

### **Flashing Warning Lights**

Flashing warning lights shall supplement all road, ramp and sidewalk closure signing, and may be added to other warning signs and/or barricades to attract the road user's attention.

### **Vehicle Warning Lights**

All vehicles shall have approved operating vehicle warning lights when decelerating to enter a TTC zone and again when a vehicle leaves the TTC zone and enters the traveled traffic lane. All vehicles within a mobile TTC operation; or working within 15 feet of an open traffic lane should have approved vehicle warning lights.

### **High Visibility Clothing**

All workers who are exposed to traffic, work vehicles or construction equipment within the TTC zone shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standard for High-Visibility Safety Apparel and Headwear" (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004 standard performance for Class 2 or 3 risk exposure.

## Work Zone Signing

Advance warning should be installed for drivers entering the TTC zone from cross streets. ROAD WORK AHEAD signs on intersecting roadways shall be installed if the motorist will not encounter another advance warning sign prior to reaching the activity area except for mobile operations.

As a general rule, signs should be located on the right-hand side of a two-way roadway and on both the right and left sides of a multi-lane divided roadway. See the "TTC Distance Charts" for the advance warning sign spacing distance called **A**. When special emphasis is needed, signs may be placed on both the left and right sides of a two-way roadway. Signs, although ordinarily mounted on posts for long term operations, may be mounted on or above barricades or on temporary supports.

Signs mounted on temporary supports should not be placed in the open traveled lane where they pose a hazard to traffic. Generally these signs are placed on the shoulder or in the parking lane of the street or highway. The signs should not be blocked from view by parked vehicles, trees or other sight obstructions on or near the roadway.

Signs shall not be mounted on existing traffic signs, posts or other utility structures without permission from the proper authority. All signs shall be mounted longitudinally perpendicular to the roadway surface and vertically plumb in accordance with the Quality Standards starting on page 6K- 87. The bottom of signs mounted on barricades or temporary supports shall be no less than one foot above the traveled way. All regulatory signs on portable supports shall be mounted with a minimum mounting height of 4 feet measured from the ground to the center of the sign face.

Some activity areas move slowly down a roadway and away from the operation's advance signing. The distance from the last advance warning sign to the activity area should not allow the motorist to forget the existence of the temporary traffic control zone. For high-speed streets and rural highways, the maximum distance from the last sign to a point where the driver detects the activity area shall not exceed one mile. In urban areas, the number of intersections shall be considered and this distance reduced accordingly.

All advance warning signs shall be at least 48 x 48 inch in size when used on high speed roadways. Warning signs used on low speed roadways shall be at least 36 x 36 inch in size. **Smaller signs may be used as approved by the governing road authority** where larger signs become an additional hazard to motorists and pedestrians.

All signs used at night shall be retroreflective with a material that has a smooth sealed outer surface that shows the same shape and color both day and night. Non-retroreflective mesh signs shall not be used at any time. Retroreflectorized roll-up signs may be used for daytime, and for nighttime only when workers are present to monitor the signs.

On multi-lane divided roadways, where the median shoulder is narrow (less than 6 feet, the 48 x 48 inch advance warning signs, as shown on the TTC layouts, may not fit on the left side of the roadway. Where this situation occurs, one of the following options may be used:

- A.) Reduce the left side signs sizes, or
- B.) Eliminate the left side signing, use an additional RIGHT LANE CLOSED (or LEFT as appropriate) sign on the right side, and require the use of an arrow board on the shoulder at the beginning of the lane closure taper.

## **Optional Signs**

Several signs are shown on the TTC layouts as optional or have factors that may make them optional. Some advance warning signs may be omitted for low speed roads and/or if the duration will be less than an hour. Read the associated notes on each layout for options. The ONE LANE ROAD AHEAD sign is an example of a sign that is only required for higher speeds. The BE PREPARED TO STOP sign is shown as optional on most TTC layouts. This sign is usually added to the compliment of signs when restricted sight distances warrant additional warning to the motorist or the advance warning area becomes extremely long due to sight distances or a move of the operation.

**All advance warning signs shall be removed, covered, or turned to face away from traffic when they are no longer required or appropriate.**

## **Crashworthy Testing Compliance**

All temporary traffic control devices, including Type A and Type B channelizing devices, Type III barricades, ballast systems and sign support structures, used on any roadway open to public travel shall be crashworthy when installed facing traffic or turned away from traffic.

FHWA policy requires that all roadside appurtenances, including temporary traffic control devices, have been successfully crash tested in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features" or the American Association of State Highway and Transportation Officials (AASHTO) "Manual for Accessing Safety Hardware (MASH)."

## GUIDELINES FOR THE USE OF PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)

The primary purpose of Portable Changeable Message Signs (PCMS) is to advise the driver of unexpected traffic and routing situations.

Important items when using a Portable Changeable Message Sign are:

### General

- A PCMS should be used to supplement conventional signs, pavement marking and lighting.
- If a PCMS is used as an arrow board, it shall meet all of the requirements of an arrow panel, and shall be used solely as an arrow board.
- Performance specifications can be found in the current version of the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD), Part 6, Section 6F.
- A PCMS installed on the shoulder of a road shall be accompanied with Type B channelizing devices (see Layout 4).

### Messages

- Each display should contain a single thought.
- The entire display should be readable twice at the posted speed limit prior to work starting.
- An accurate description of the work location or the incident location is critical.
- The PCMS shall have readable up-to-date information. Any delay message should accurately reflect the traffic delay time.
- A PCMS message shall use days of the week not calendar dates.
- The use of abbreviations is discouraged. The entire word should be spelled out whenever space permits.
- If abbreviations are used, they should be easily understood (see the list of standard abbreviations on Page 6K-xxviii and xix).
- Displays shall not scroll horizontally or vertically across the face of the sign.

For more information on the use of PCMSs, see “2012 CMS Manual of Practice” at the following website:

<http://dotapp7.dot.state.mn.us/edms/download?docId=1244587>

## Requirements

The specifications for use of a PCMS are in the following table.

Requirements	Type A	Type B	Type C
Line(s) of Message	1 Line	2 Lines	3 Lines
Typical Mounting	Vehicle Mounted	Vehicle or Trailer Mounted	Trailer Mounted
Allowed Usage	Emergency and Incident Mgmt.	Advance Warning	Advance Warning & Advance Notice
Legibility Distance Requirements	Legible at 350 feet	Legible at 750 feet	Legible at 900 feet
Minimum Character Height	10 inches	14 inches	18 inches
Maximum No. of Displays	1	2	* 40 mph or less = 3 * 45 mph or more = 2
Message Cycle	Constant	at least 2 seconds per display	at least 2 seconds per display
Minimum Sign Panel Height	5 feet (rural) 7 feet (urban)	5 feet (rural) 7 feet (urban)	5 feet (rural) 7 feet (urban)
Minimum PCMS Spacing	500 feet	1000 feet	1000 feet

\* Posted speed limit prior to work starting.

Table 6F-2

## Abbreviations That Shall be Used Only on Portable Changeable Message Signs

Word Message	Standard Abbreviation	Prompt Word That Should Precede the Abbreviation	Prompt Word That Should Precede the Abbreviation
Access	ACCS	---	---
Ahead	AHD	Fog	---
Blocked	BLKD	Lane	---
Bridge	BR*	(Name)	---
Cannot	CANT	---	---
Center	CNTR	---	Lane
Chemical	CHEM	---	Spill
Condition	COND	Traffic	---
Congested	CONG	Traffic	---
Construction	CONST	---	Ahead
Crossing	XING	---	---
Do Not	DONT	---	---
Downtown	DWNTN	---	Traffic
Eastbound	E-BND	---	---
Emergency	EMER	---	---
Entrance, Enter	ENT	---	---
Exit	EX	Next	---
Express	EXP	---	Lane
Frontage	FRNTG	---	Road
Hazardous	HAZ	---	Driving
Highway-Rail Grade Crossing	RR XING	---	---
Interstate	I-*	---	(Number)
It is	ITS	---	---
Lane	LN	(Roadway Name)*, Right, Left, Center	---
Left	LFT	---	---
Local	LOC	---	Traffic
Lower	LWR	---	Level
Maintenance	MAINT	---	---
Major	MAJ	---	Accident
Minor	MNR	---	Accident
Normal	NORM	---	---
Northbound	N-BND	---	---
Oversized	OVRSZ	---	Load
Parking	PKING	---	---
Pavement	PVMT	Wet	---
Prepare	PREP	---	To Stop
Quality	QLTY	Air	---
Right	RT	Keep, Next	---
Right	RT	---	Lane
Roadwork	RDWK	---	Ahead, (Distance)

\* This abbreviation, when accompanied by the prompt word, may be used on traffic control other than portable changeable message signs.

\*\* A space and no dash shall be placed between the abbreviation and the number of the route.

Table 6F-3 (sheet 1 of 2)

## Abbreviations That Shall be Used Only on Portable Changeable Message Signs

Word Message	Standard Abbreviation	Prompt Word That Should Precede the Abbreviation	Prompt Word That Should Precede the Abbreviation
Route	RT,RTE	Best	---
Service	SERV	---	---
Shoulder	SHLDR	---	---
Slippery	SLIP	---	---
Southbound	S-BND	---	---
Speed	SPD	---	---
State, county, or other non-US or non-Interstate numbered route	(Route Abbreviation determined by highway agency)**	---	Number
Tires with Lugs	LUGS	---	---
Traffic	TRAF	---	---
Travelers	TRVLS	---	---
Two-Wheeled Vehicles	CYCLES	---	---
Upper	UPR	---	---
Vehicle(s)	VEH, VEHS	---	---
Warning	WARN	---	---
Westbound	W-BND	---	---
Will Not	WONT	---	---

\* This abbreviation, when accompanied by the prompt word, may be used on traffic control other than portable changeable message signs.

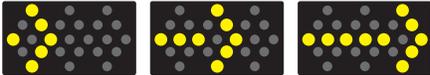
\*\* A space and no dash shall be placed between the abbreviation and the number of the route.

Table 6F-3 (sheet 2 of 2)

## Unacceptable Abbreviations

Abbreviation	Intended Word	Common Misinterpretation
ACC	Accident	Access (Road)
CLRS	Clears	Colors
DLY	Delay	Daily
FDR	Feeder	Federal
L	Left	Lane (Merge)
LT	Light (Traffic)	Left
PARK	Parking	Park
POLL	Pollution (Index)	Poll
RED	Reduce	Red
STAD	Stadium	Standard
TH	Trunk Highway	misunderstood

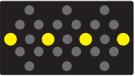
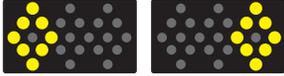
Table 6F-4

Operating Mode	Panel Display *
1. At least one of the following two modes shall be provided:	( Right arrow is shown, left arrow is similar )
<b>Flashing Arrow</b>	 <b>Move/Merge Right</b>
<b>Sequential Arrow</b>	 <b>Move/Merge Right</b>
<b>Sequential Chevron</b>	 <b>Move/Merge Right</b>

2. The following mode shall be provided:

<b>Flashing Double Arrow</b>	 <b>Move/Merge Right or Left</b>
------------------------------	---

3. At least one of the following three modes shall be provided:

<b>Flashing Four Corners</b>	
<b>Flashing Bar</b>	
<b>Alternating Flashing Diamonds</b>	 <b>Caution</b>

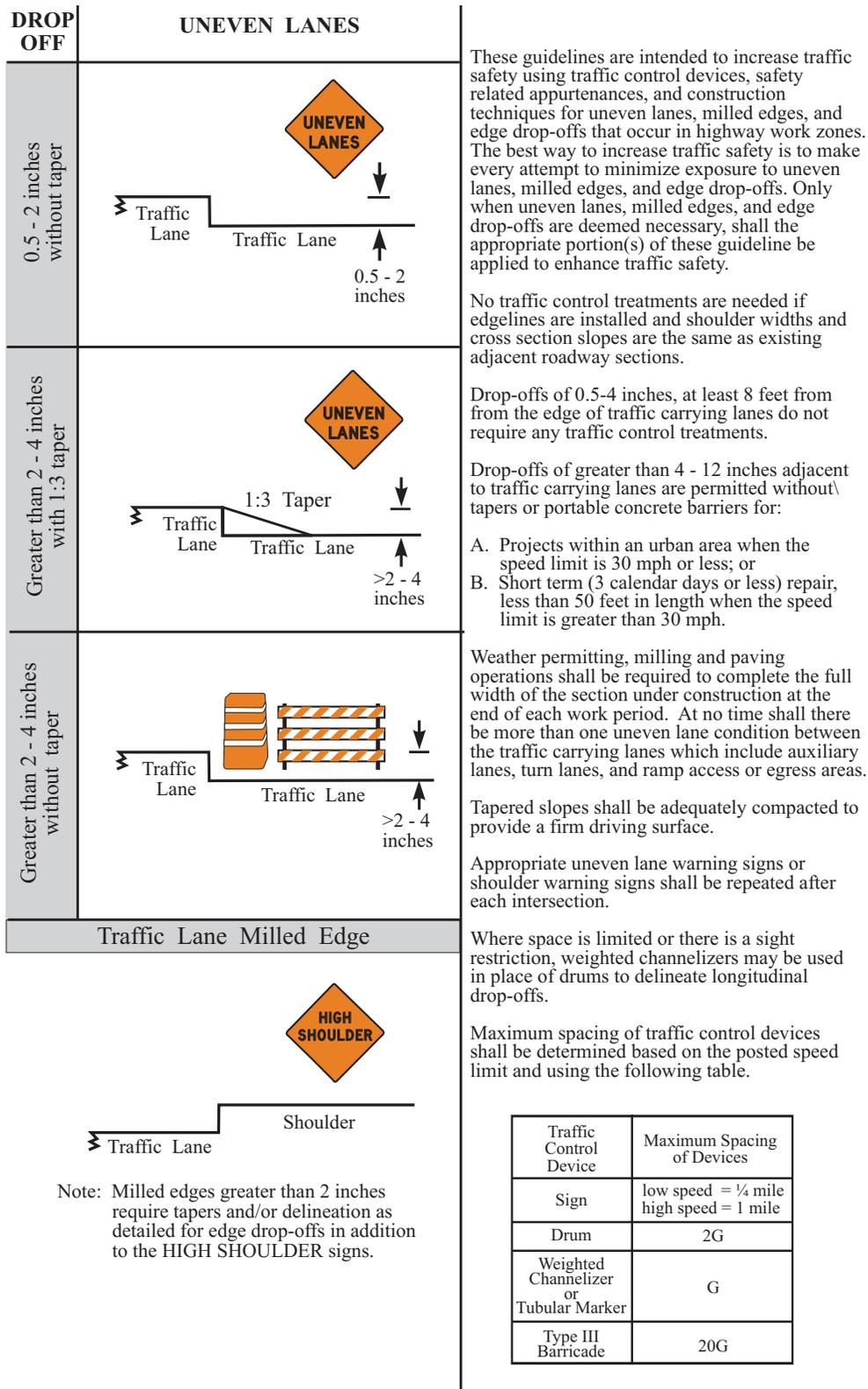
\* Element layout for Type C panel shown

Panel Type	Minimum Size (inches)	Minimum Legibility Distance (miles)	Minimum Number of Elements	Recommended Usage
A	48 x 24	0.5	12	Low speed streets
B	60 x 30	0.75	13	Anything not covered in A or C
C	96 x 48	1	15	Freeways and Expressways

<b>Arrow Stick</b>	
Arrow Sticks may supplement other TTC devices, but shall not be used in place of arrow boards	

## Advance Warning Arrow Board Specifications

Figure 6K-2



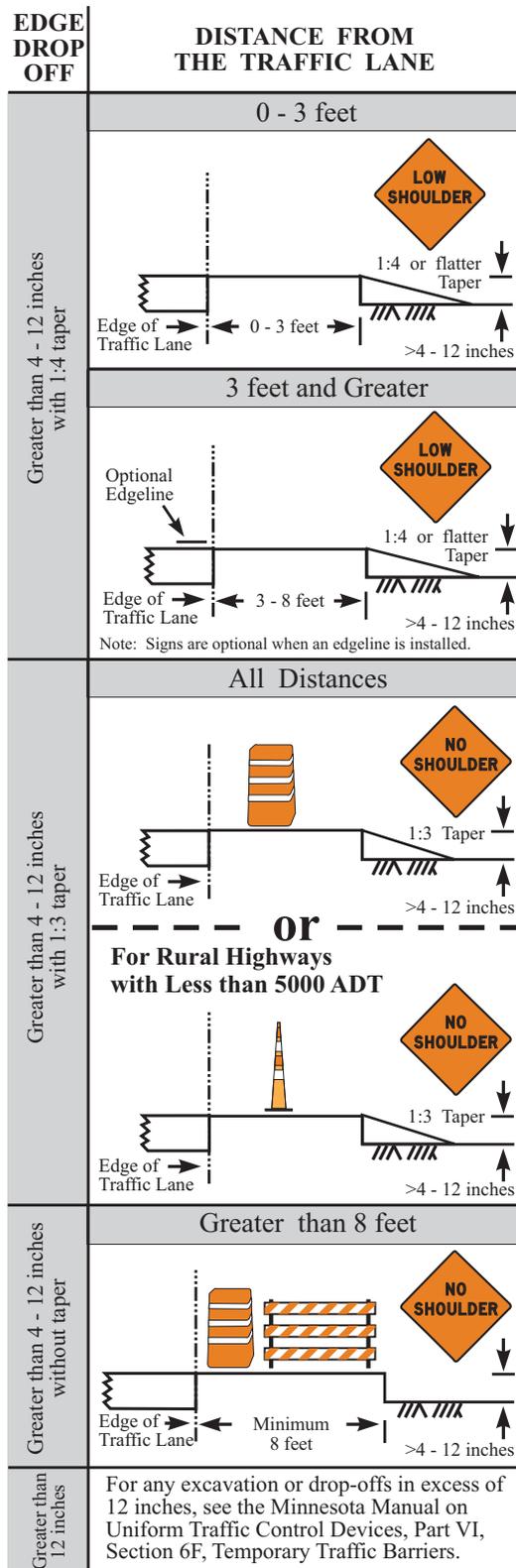
## Longitudinal Drop-off Guidelines

Figure 6K-3

EDGE DROP OFF	DISTANCE FROM THE TRAFFIC LANE	
	0 - 3 feet	3 - 8 feet
0.5 - 2 inches without taper	<p>Edge of Traffic Lane → 0 - 3 feet →</p> <p>0.5 - 2 inches</p> <p><b>LOW SHOULDER</b></p>	<p>Edge of Traffic Lane → 3 - 8 feet →</p> <p>0.5 - 2 inches</p> <p>Optional Edgeline</p> <p><b>LOW SHOULDER</b></p> <p>Note: Signs are optional when an edgeline is installed.</p>
Greater than 2 - 4 inches with 1:3 taper	<p>Edge of Traffic Lane → 0 - 3 feet →</p> <p>1:3 Taper</p> <p>&gt;2 - 4 inches</p> <p><b>LOW SHOULDER</b></p>	<p>Edge of Traffic Lane → 3 - 8 feet →</p> <p>1:3 Taper</p> <p>&gt;2 - 4 inches</p> <p>Optional Edgeline</p> <p><b>LOW SHOULDER</b></p> <p>Note: Signs are optional when an edgeline is installed.</p>
Greater than 2 - 4 inches without taper	<p>Edge of Traffic Lane → 0 - 3 feet →</p> <p>&gt;2 - 4 inches</p> <p>Alternate Position</p> <p><b>NO SHOULDER</b></p>	<p>Edge of Traffic Lane → 3 - 8 feet →</p> <p>&gt;2 - 4 inches</p> <p><b>NO SHOULDER</b></p>
	<p style="text-align: center;"><b>OR</b></p> <p style="text-align: center;"><b>For Rural Highways with Less than 5000 ADT</b></p> <p>Edge of Traffic Lane → 0 - 3 feet →</p> <p>&gt;2 - 4 inches</p> <p>Alternate Position</p> <p><b>NO SHOULDER</b></p>	<p style="text-align: center;"><b>OR</b></p> <p style="text-align: center;"><b>For Rural Highways with Less than 5000 ADT</b></p> <p>Edge of Traffic Lane → 3 - 8 feet →</p> <p>&gt;2 - 4 inches</p> <p>Edgeline</p> <p><b>NO SHOULDER</b></p>

## Longitudinal Drop-off Guidelines

Figure 6K-4



These guidelines are intended to increase traffic safety using traffic control devices, safety related appurtenances, and construction techniques for uneven lanes, milled edges, and edge drop-offs that occur in highway work zones. The best way to increase traffic safety is to make every attempt to minimize exposure to uneven lanes, milled edges, and edge drop-offs. Only when uneven lanes, milled edges, and edge drop-offs are deemed necessary, shall the appropriate portion(s) of these guideline be applied to enhance traffic safety.

No traffic control treatments are needed if edgelines are installed and shoulder widths and cross section slopes are the same as existing adjacent roadway sections.

Drop-offs of 0.5 - 4 inches, at least 8 feet from from the edge of traffic carrying lanes do not require any traffic control treatments.

Drop-offs of greater than 4 - 12 inches adjacent to traffic carrying lanes are permitted without tapers or portable concrete barriers for:

- A. Projects within an urban area when the speed limit is 30 mph or less; or
- B. Short term (3 calendar days or less) repair, less than 50 feet in length when the speed limit is greater than 30 mph.

Weather permitting, milling and paving operations shall be required to complete the full width of the section under construction at the end of each work period. At no time shall there be more than one uneven lane condition between the traffic carrying lanes which include auxiliary lanes, turn lanes, and ramp access or egress areas.

Tapered slopes shall be adequately compacted to provide a firm driving surface.

Appropriate uneven lane warning signs or shoulder warning signs shall be repeated after each intersection.

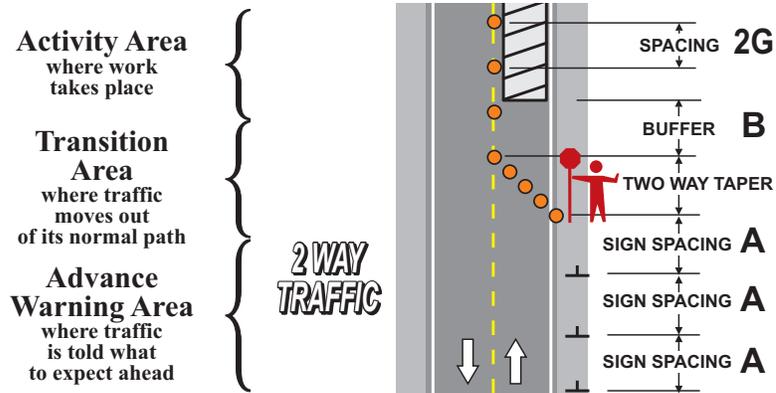
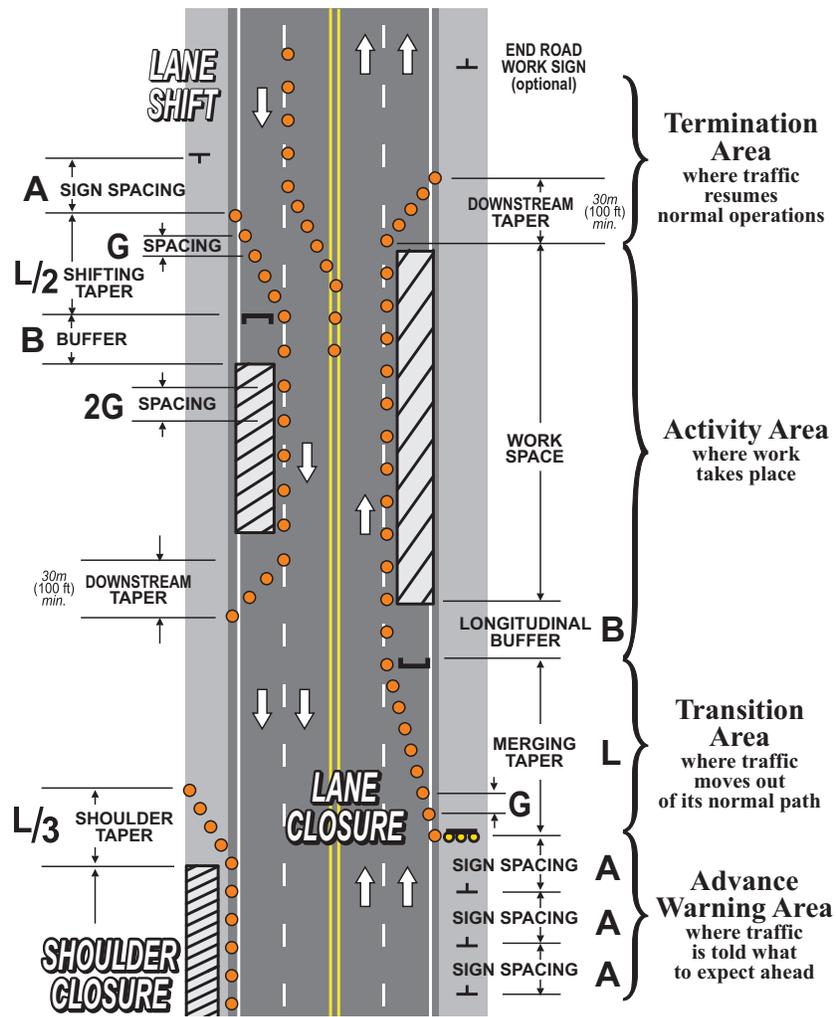
Where space is limited or there is a sight restriction, weighted channelizers may be used in place of drums to delineate longitudinal drop-offs.

Maximum spacing of traffic control devices shall be determined based on the posted speed limit and using the following table.

Traffic Control Device	Maximum Spacing of Devices
Sign	low speed = ¼ mile high speed = 1 mile
Drum	2G
Weighted Channelizer or Tubular Marker	G
Type III Barricade	20G

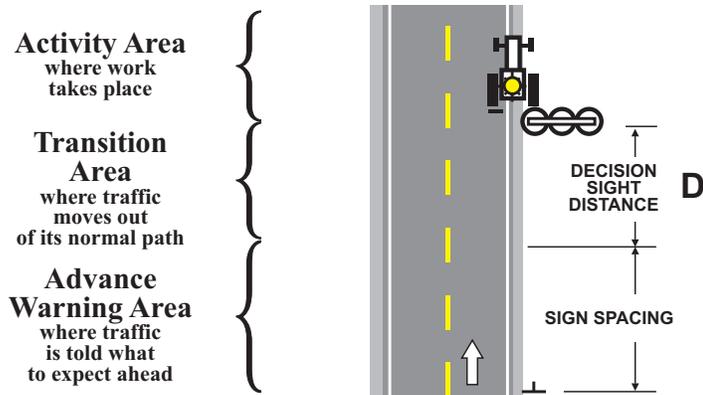
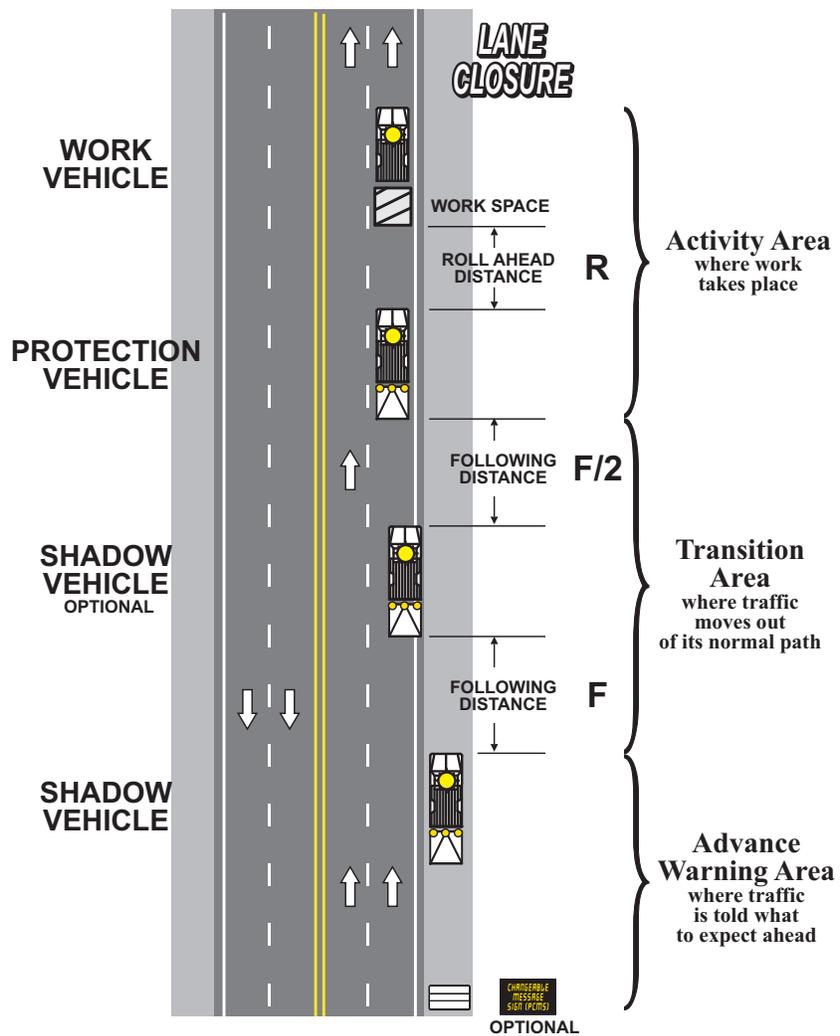
## Longitudinal Drop-off Guidelines

Figure 6K-5



### Components of a Stationary Temporary Traffic Control Zone

Figure 6K-6



## Components of a Mobile Temporary Traffic Control Zone

Figure 6K-7

	R1-1		R11-3a		W8-1
	R1-2		R11-4		W8-1a
	R1-X3		W1-4R		W8-8
	R3-1		W1-4L		W8-9
	R3-2		W1-6		W8-11
	R4-7c		W3-1		W8-15P
	R10-6R		W3-2		W8-23
	R10-6L		W3-3		W9-3a
	R9-9		W3-4		W13-1P
	R9-10		W4-2R		W20-1
	R9-11R		W4-2L		W20-4
	R9-11L		W7-3aP		W20-7
	R11-2				

## SIGN CODES QUICK REFERENCE

For additional signs and information on typical sizes and usage, see the Minnesota Manual on Uniform Traffic Control Devices <http://www.dot.state.mn.us/trafficeng/publ/mutcd/index.html>

Figure 6K-8

	W20-100P		W21-X5		W22-2
	W20-X3R		W21-X5a		W22-3
	W20-X3L		W21-X5L		G20-4
	W20-X12		W21-X6		G20-X1
	W20-X13R		Flagger Paddle		G20-X7
	W20-X13L		W21-X7		
	W20-X16		W21-X9		G20-X9
	W20-X18		W21-X10		G20-X10
	W21-1		W21-X11		G20-X11
	W21-X4aR				G20-X12
	W21-X4aR		W21-X12		
					
	W21-X4aRA		W22-1		G20-X14
	W21-X4aRS				

## SIGN CODES QUICK REFERENCE

For additional signs and information on typical sizes and usage, see the Minnesota Manual on Uniform Traffic Control Devices <http://www.dot.state.mn.us/trafficeng/publ/mutcd/index.html>

Figure 6K-9

**SAMPLE  
PROJECT INSPECTION CHECKLIST**

**PROJECT - \_\_\_\_\_**

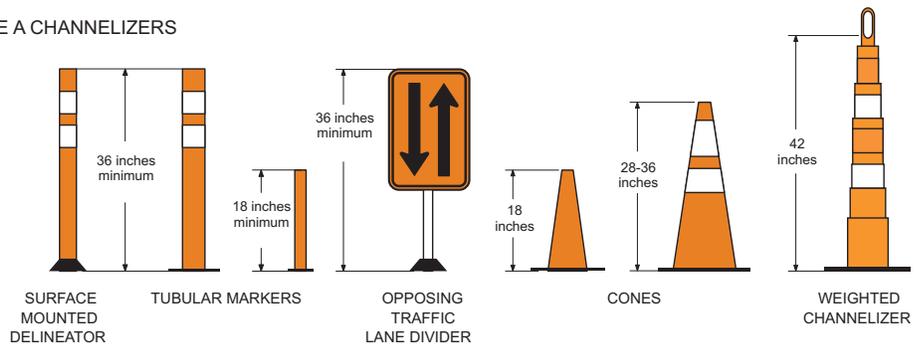
ITEM	YES	NO	HOW MANY?
1. Are any devices missing?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Do any devices need repair?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Were all replaced or repaired?	<input type="checkbox"/>	<input type="checkbox"/>	_____
2. Are any lights (flashers, etc.) not functioning	<input type="checkbox"/>	<input type="checkbox"/>	_____
Were they all replaced or repaired?	<input type="checkbox"/>	<input type="checkbox"/>	
3. Are any devices improperly placed?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Were all positions corrected?	<input type="checkbox"/>	<input type="checkbox"/>	
4. Do any devices need cleaning?	<input type="checkbox"/>	<input type="checkbox"/>	_____
Were all devices cleaned?	<input type="checkbox"/>	<input type="checkbox"/>	
ADDITIONAL COMMENTS ON THE BACK OF THIS FORM	<input type="checkbox"/>	<input type="checkbox"/>	

The above check was completed by \_\_\_\_\_  
(name / title)

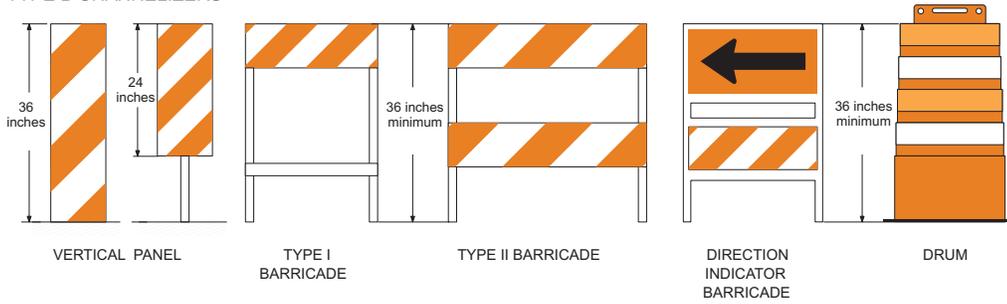
on \_\_\_\_\_ at \_\_\_\_\_  a.m.  p.m.  
(date) (time)

**Figure 6K-10**

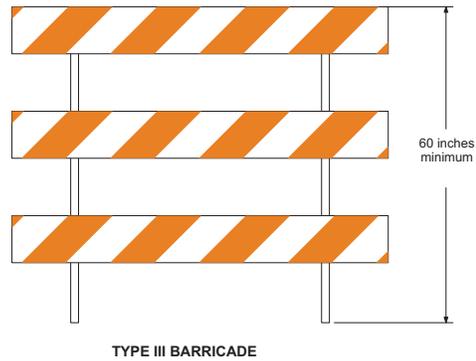
TYPE A CHANNELIZERS



TYPE B CHANNELIZERS

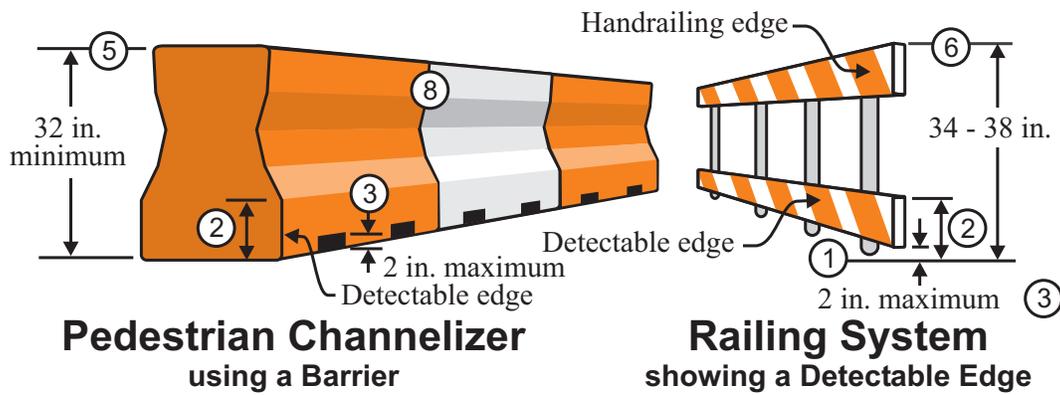


TYPE C CHANNELIZER



**Channelizing Devices**

Figure 6K-11



**NOTES:**

1. To prevent any tripping hazard to pedestrians, ballast shall be located behind or internal to the device. Any support on the front of the device shall not extend into the 48 in. minimum walkway clear space and shall have 0.5 in. maximum height above the walkway surface with approved beveling (see note #9 on page 6K-xxx for beveling details).
2. Detectable edges for long canes shall be continuous and 6 in. min high above the walkway surface and have color or markings contrasting with the walkway surface.
3. Devices shall not block water drainage from the walkway. A gap height or opening from the walkway surface up to 2 in. maximum height is allowed for drainage purposes.
4. Railings or other objects may protrude a maximum of 4 in. into the walkway clear space when located 27 in. minimum above the walkway surface.
5. Longitudinal channelizing devices for pedestrians shall be 32 in. high or greater.
6. When hand guidance is required, the top rail or top surface shall:
  - be in a vertical plane perpendicular to the walkway above the detectable edge,
  - be continuous at a height of 34 to 38 in. above the walkway surface, and
  - be supported with minimal interference to the pedestrian's hands or fingers.
7. All devices shall be free of sharp or rough edges, and fasteners (bolts) shall be rounded to prevent harm to hands, arms or clothing of pedestrians.
8. All devices used to channelize pedestrian flow should interlock such that gaps do not allow pedestrians to stray from the channelized path.
9. Any pedestrian devices used to provide positive protection (traffic or hazard) for pedestrians or workers shall meet crashworthy requirements appropriate for the barriers' application.
10. Barricades shall be used to close the entire width of the walkway surface.
11. A walkway surface shall be firm, stable, and slip resistant.

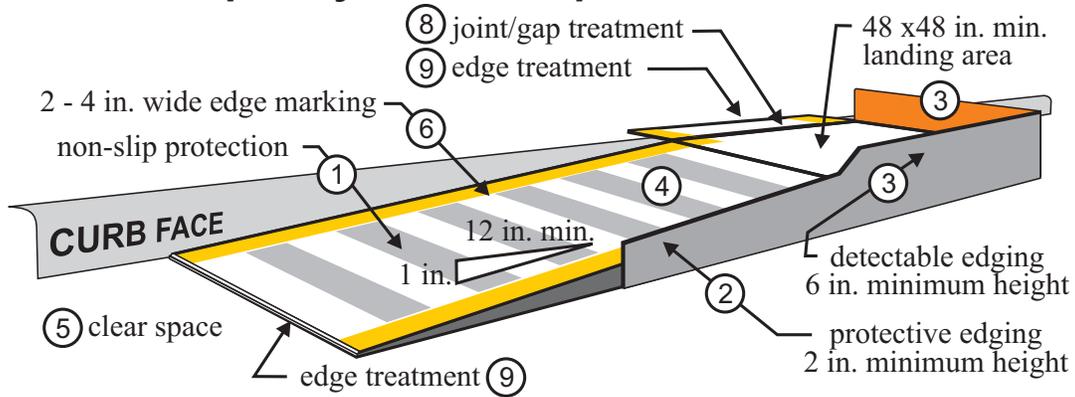


**Typical TPAR Devices**

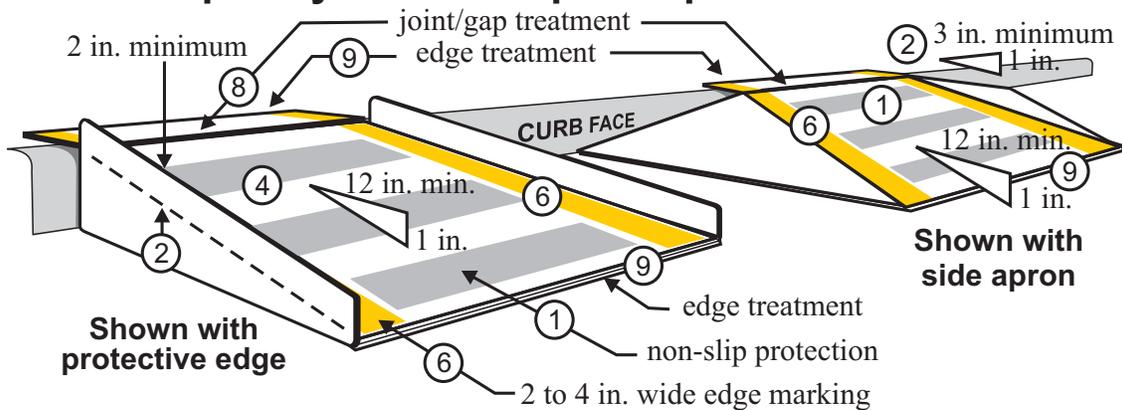
Refer to the MnDOT TPAR website for additional standards, guidance, and options for designing temporary pedestrian access routes.

Figure 6K-12

## Temporary Curb Ramp - Parallel to Curb



## Temporary Curb Ramp - Perpendicular to Curb



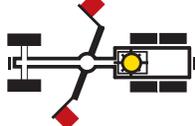
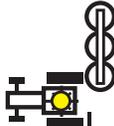
### NOTES:

1. Curb ramps shall be 48 in. minimum width with a firm, stable and non-slip surface.
2. Protective edging with a 2 in. minimum height shall be installed when the curb ramp or landing platform has a vertical drop of 6 in. or greater or has a side apron slope steeper than 1:3 (33%). Protective edging should be considered when curb ramps or landing platforms have a vertical drop of 3 in. or more.
3. Detectable edging with 6 in. minimum height and contrasting color shall be installed on all curb ramp landings where the walkway changes direction (turns).
4. Curb ramps and landings should have a 1:50 (2%) max cross-slope.
5. Clear space of 48 x 48 in. minimum shall be provided above and below the curb ramp.
6. The curb ramp walkway edge shall be marked with a contrasting color 2 to 4 in. wide marking. The marking is optional where color contrasting edging is used.
7. Water flow in the gutter system shall have minimal restriction.
8. Lateral joints or gaps between surfaces shall be less than 0.5 in. width.
9. Changes between surface heights should not exceed 0.5 in. Lateral edges should be vertical up to 0.25 in. high, and beveled at 1:2 between 0.25 in. and 0.5 in. height.

## Typical TPAR Devices

Refer to the MnDOT TPAR website for additional standards, guidance, and options for designing temporary pedestrian access routes.  
<http://www.dot.state.mn.us/trafficeng/workzone/tpar.html>

Figure 6K-13

Symbols	Meaning
	Flagger or Operator of Automated Flagging Assistance Device
 <b>AFAD</b>	Automated Flagging Assistance Device (AFAD)
	Flashing Arrow Board (FAB)
	Portable Changeable Message Sign (PCMS)
	Portable Equipment - includes testing devices, detection, surveying, etc.
	Portable Traffic Signal
	360-Degree Yellow Flashing Vehicle Light(s)
	Work Vehicle
	Work Vehicle with Crash Attenuator (Truck or Trailer Mounted)
	Motor Grader
	Mower
	Type III Barricade
	Traffic Control Sign
	Type A Flashing Warning Light
	Channelizing Device.
	A combination of Type A and B channelizing devices
	Direction of Traffic
	See Note; i.e. See Note 6
	Work Space

## Symbols Used in Typical Layouts

Figure 6K-14

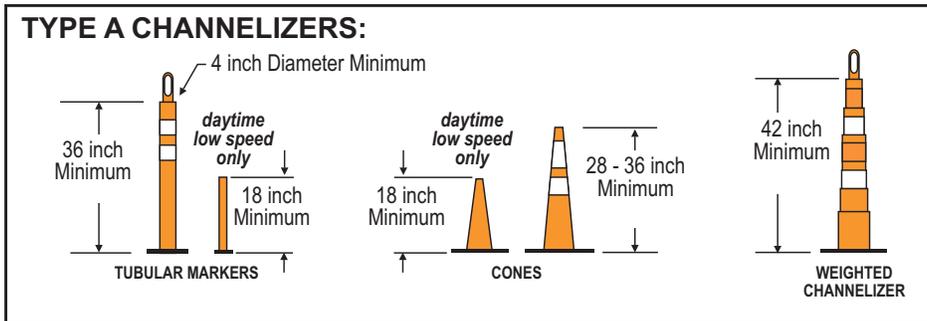
## Temporary Traffic Control Distance Charts

Posted Speed Limit Prior to Work Starting (mph)		Advance Warning Sign Spacing (A) feet	Decision Sight Distance (D) feet	Taper Length (12 ft lane) (L) feet	Shifting Taper (L/2) feet	Typical Shoulder Taper (L/3) feet
0 - 30	G = 25 ft	250	550	200	100	75
35 - 40		325	700	325	175	125
45 - 50	G = 50 ft	600	900	600	300	200
55		750	1200	700	350	250
60 - 65		1000	1400	800	400	275
70 - 75		1200	1600	900	450	300

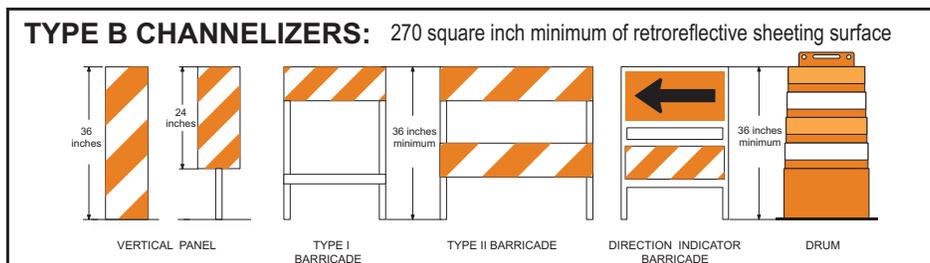
  

Posted Speed Limit Prior to Work Starting (mph)		Buffer Space (B) feet	Shadow Vehicle Following Distance (F) feet	Protection Vehicle Roll-Ahead Buffer Distance (with or without TMA) (R) feet	
				Moving (15 mph max)	Stopped
0 - 30	G = 25 ft	200	250 - 550	100	100
35 - 40		305	325 - 700	100	100
45 - 50	G = 50 ft	425	600 - 900	175	125
55		500	750 - 1200	175	125
60 - 65		650	1000 - 1400	225	175
70 - 75		820	1200 - 1600	225	175

Type A channelizing devices are typically used in attended temporary traffic control zones.\*



Type B channelizing devices shall be used if the temporary traffic control zone will be installed for more than 12 hours or if it is left unattended.\*



\* See the MN MUTCD, Part 6F for more details on application restrictions.

Figure 6K-15

The Temporary Traffic Control  
Distance Charts can be found on  
page 6K-125

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Two-Lane  
Two-Way



# Two-Lane Two-Way

A road consisting of two opposing lanes of undivided traffic.

## TWO LANE - TWO WAY ROADS

Low Volume Less than 400 ADT	MOBILE	SHORT DURATION	SHORT TERM	INTERMEDIATE TERM
	15 Minutes or Less	One Hour or Less	12 Hours or Less	3 Days or Less
Lane Closure	5			
Uncontrolled	9			
One Flagger Control	10 *			
Work in Center of Road	22			
Work in Intersection	28 (low speed only)			

Intermediate Volume Up to 1500 ADT	MOBILE	SHORT DURATION	SHORT TERM	INTERMEDIATE TERM
	15 Minutes or Less	One Hour or Less	12 Hours or Less	3 Days or Less
Lane Closure	5			
Flagger Control	8 *		11 *	
AFAD	12 *			
Work in Center of Road	21 *			

All ADTs	MOBILE	SHORT DURATION	SHORT TERM	INTERMEDIATE TERM
	15 Minutes or Less	One Hour or Less	12 Hours or Less	3 Days or Less
Work on Shoulder		1		2, 4
Work off Shoulder	2			
Parking Lane Closure	3			
Lane Closure	6, 7 *			
2 Flagger Control	13 *			
Moving Work Spaces	14 *			
Near Intersection	15, 16 *			
Pilot Car Operation	17 *			
Near Railroad Xing	18 *			
Portable Signal Control	19			
STOP Sign Control	20			
Work in Center of Road	22 *			
Lane Shift	24			
Two-Way Left Turn Lanes				
Lane Shift	25			
Center Lane Closure	26			
Turn Lane Closures	42			
Work in Intersection	29 (low speed only)			
Road Closure	81 *		80	
Sidewalk Closure	84, 85			

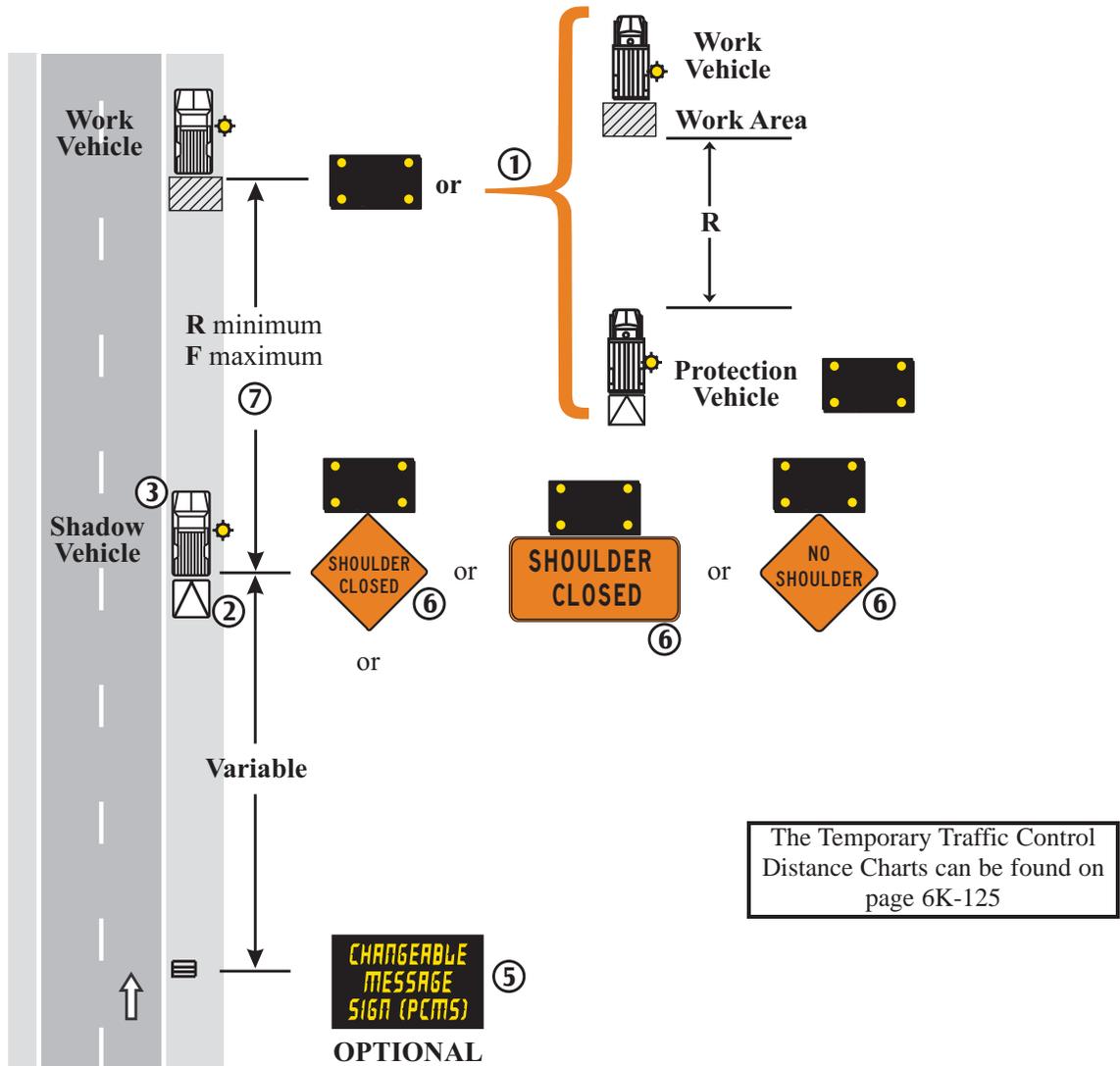
\* This layout may be used for night time operations only if the flagging stations are occupied and illuminated with portable lights.

These Layouts as well as the entire Field Manual, the Flagging Handbook and other documents are available on the Mn/DOT, Traffic Engineering website at:

<http://www.dot.state.mn.us/trafficeng/>

NOTES:

1. A work vehicle without a flashing arrow board shall be followed by a protection vehicle at a distance of **R**. The protection vehicle shall be equipped with a flashing arrow panel and should have a truck mounted attenuator.
2. Any shadow vehicle or protection vehicle operating totally or partially in a traffic lane should be equipped with a truck mounted attenuator.
3. The shadow vehicle or protection vehicle may encroach into the traffic lane when the shoulder is too narrow to drive on.
4. Any vehicle not displaying a flashing arrow board shall display high-intensity rotating, flashing, oscillating, or strobe lights.
5. The PCMS shall be used for nighttime operations.
6. When the PCMS is used, the SHOULDER CLOSED or NO SHOULDER sign becomes optional.
7. The distance between the work area and the shadow vehicle should be adjusted between **R** and **F** based on traffic volume and sight distance.



**SHOULDER CLOSURE  
MOBILE AND SHORT DURATION**

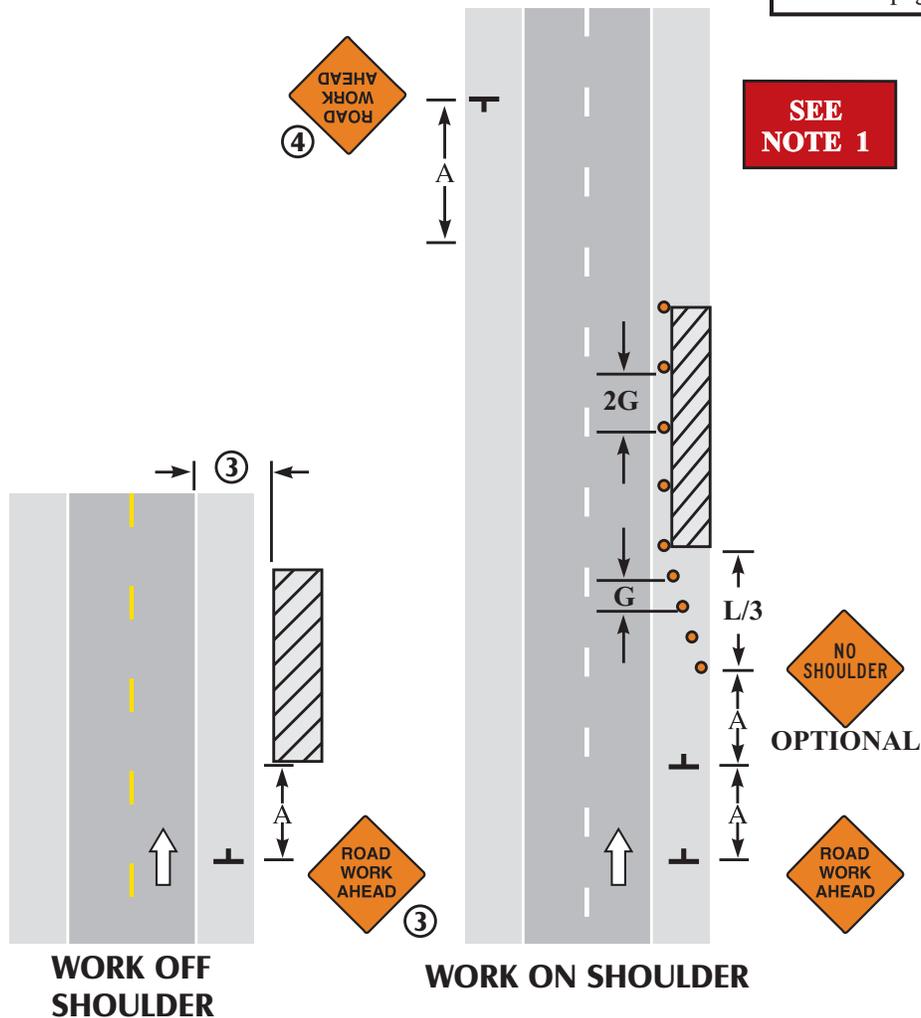
1 HOUR or LESS

LAYOUT 1

NOTES:

1. All signs, barricades and channelizing devices may be omitted when the work occupies an isolated shoulder location for less than one hour and it has little or no interference with traffic.
2. An operation which moves between work spaces that are less than the decision sight distance along the shoulder should use a stationary or mobile shoulder closure.
3. The ROAD WORK AHEAD sign may be omitted for short term daylight operations if:
  - a. the distance from curb face to the work space is at least 2 feet, or
  - b. the distance from the edge of the roadway to the work space is at least 15 feet
 and a vehicle displaying a 360-degree flashing beacon is operating.
4. This ROAD WORK AHEAD sign shall be installed on 2-lane, 2-way roads if traffic control devices are installed for a work space in the opposite shoulder.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**SHOULDER CLOSURE  
WORK ON OR NEAR SHOULDER**

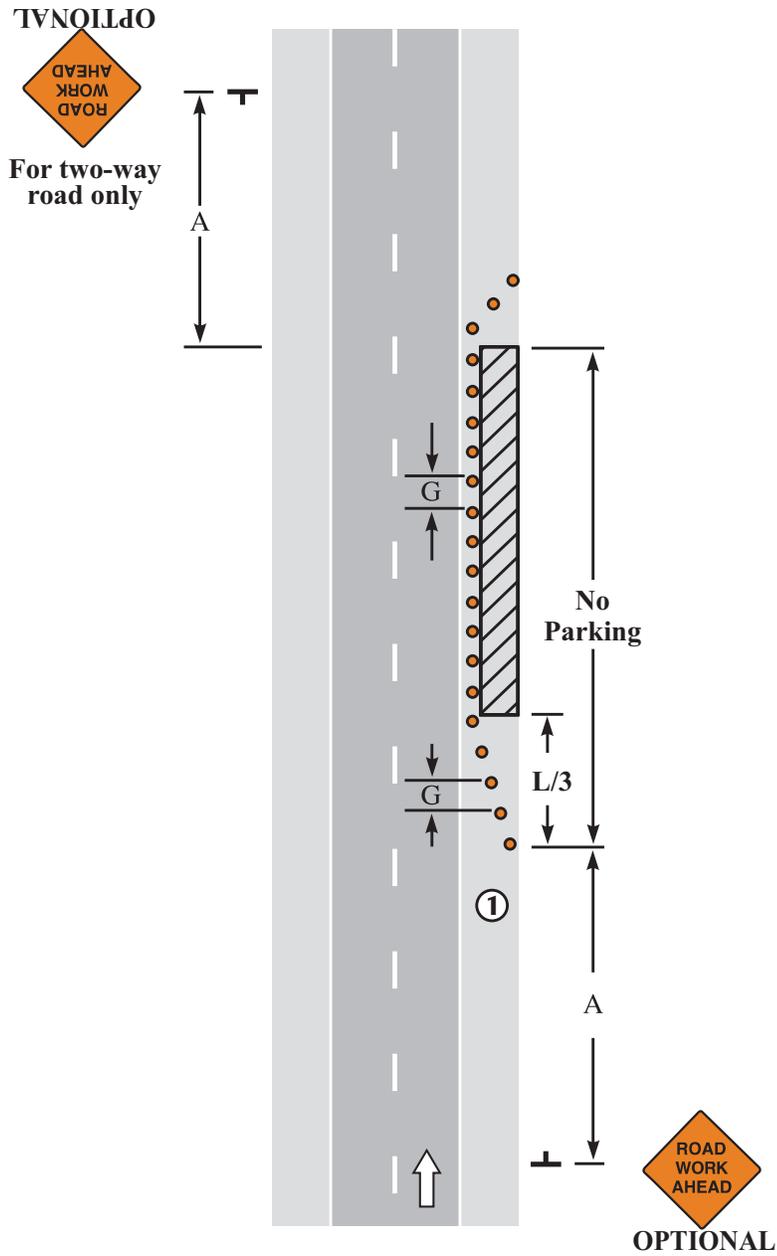
3 DAYS or LESS

LAYOUT 2

NOTE:

1. This layout is intended for use where a parking lane is closed. If this parking lane is normally open to vehicle travel during the time of day this closure will be in effect, the lane shall be considered a traveled lane and not a parking lane. The appropriate layout shall then be used to provide traffic control for the lane closure.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**PARKING LANE CLOSURE**

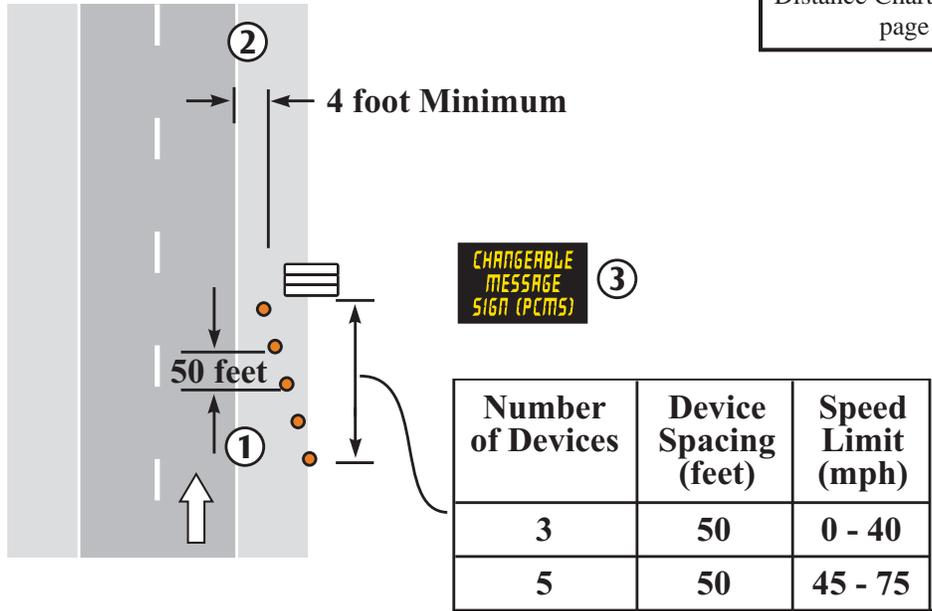
3 DAYS or LESS

LAYOUT 3

NOTES:

1. Type B channelizing devices shall be used in the shoulder taper regardless of the location on the shoulder or the width of the shoulder.
2. Trailer mounted traffic control devices shall be placed at least 4 feet from the edge of the traveled lane. If the 4 feet clearance can not be met, then a full shoulder closure shall be provided.
3. Typical trailer mounted traffic control devices may include flashing arrow boards, automated flagging assistance devices (AFADs), portable signals, portable changeable message signs, portable dynamic speed display signs, communications equipment, or other data collection devices.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**PARTIAL SHOULDER CLOSURE  
TRAILER MOUNTED TRAFFIC CONTROL  
DEVICES ON SHOULDER**

3 DAYS or LESS

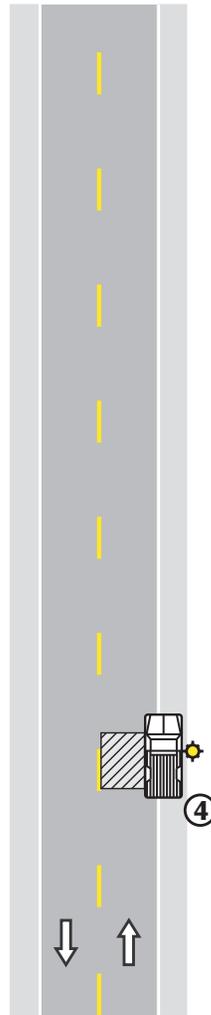
LAYOUT 4

**NOTES:**

1. If the approach sight distance is restricted, a spotter should be used to protect the work area and to warn the driver.
2. If the visibility is poor or the operation does not move at least the Decision Sight Distance (**D**) every 15 minutes, the appropriate stationary layout should be used.
3. This layout may be used for nighttime operations only in locations where the posted speed limit is 40 mph or less.
4. The slow moving or stopped work vehicle should keep the traffic lane as wide as possible by using the shoulder space whenever possible.

The Temporary Traffic Control Distance Charts can be found on page 6K-125

**USE FOR ROADS  
LESS THAN  
1500 ADT ONLY**



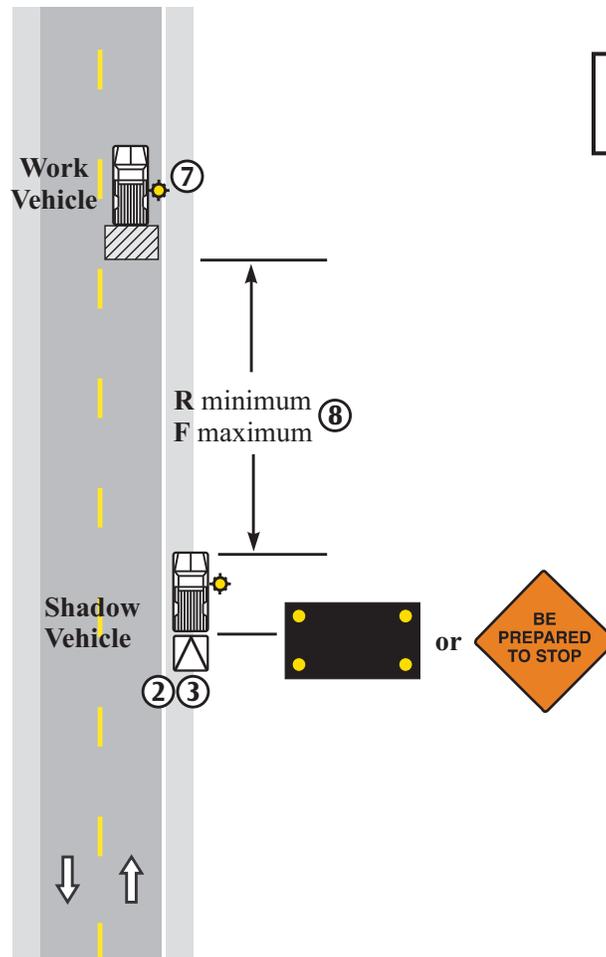
**LANE CLOSURE  
TWO-LANE TWO-WAY ROAD**

15 MINUTES or LESS

LAYOUT 5

**NOTES:**

1. If the work space is not visible for at least the Decision Sight Distance, the motorists cannot see beyond the work space or traffic volumes do not allow passage, then Layout 7 shall be used.
2. Any shadow vehicle or protection vehicle operating totally or partially in a traffic lane should be equipped with a truck mounted attenuator.
3. The shadow vehicle or protection vehicle may encroach into the traffic lane when the shoulder is too narrow to drive on.
4. If the work space does not move at least the Decision Sight Distance every 15 minutes, the appropriate stationary layout shall be used.
5. This layout may be used for nighttime operations only in locations where the posted speed limit is 40 mph or less.
6. For nighttime operations, the flashing arrow board shall be used.
7. The slow moving or stopped work vehicle and shadow vehicle should keep the traffic lane as wide as possible by using the shoulder space whenever practical.
8. The distance between the work area and the shadow vehicle should be adjusted between **R** and **F** based on traffic volume and sight distance.



The Temporary Traffic Control Distance Charts can be found on page 6K-125

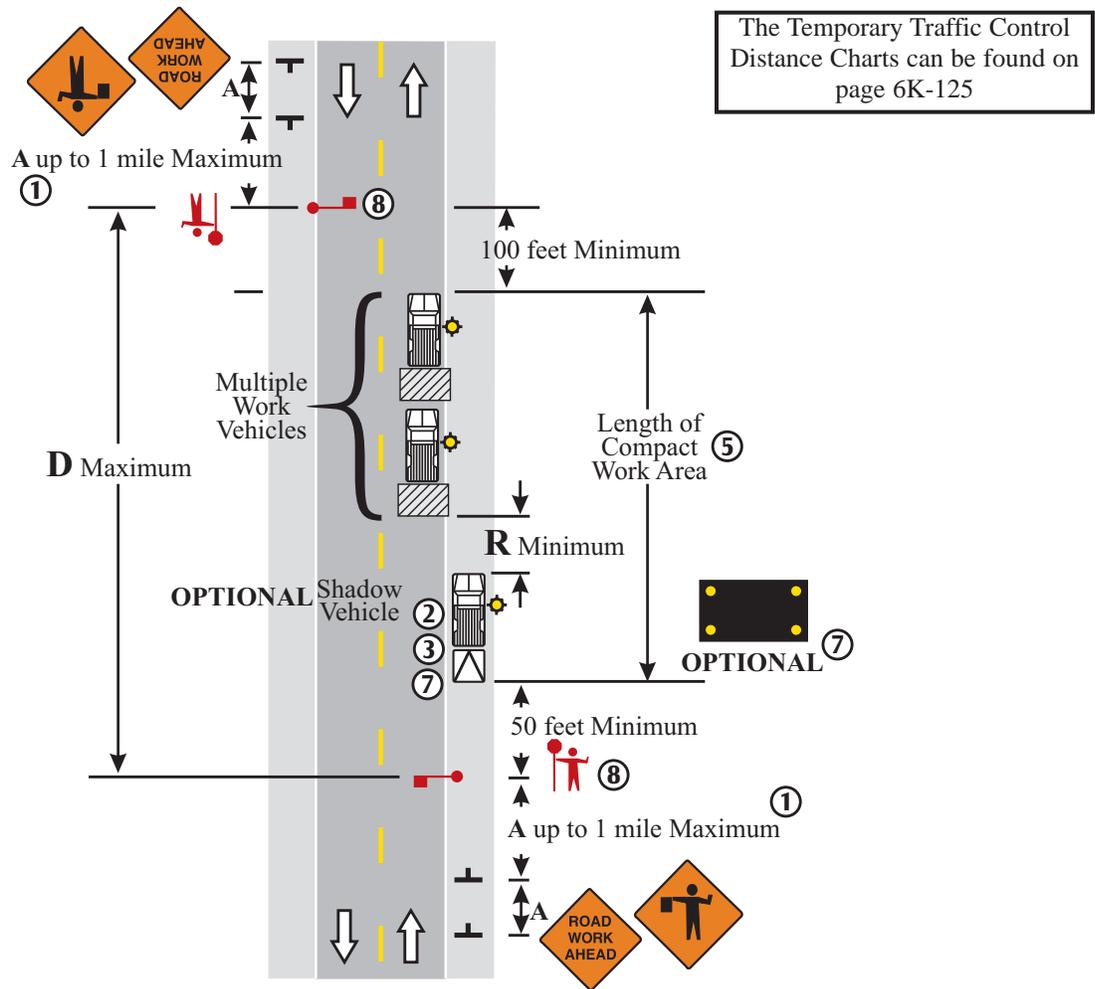
**LANE CLOSURE  
WITH RANDOM WORK AREAS  
TWO-LANE TWO-WAY ROAD**

15 MINUTES or LESS

LAYOUT 6

**NOTES:**

1. The advance warning signs should be moved or reset after each major road intersection or after each mile whichever comes first.
2. Any shadow vehicle or protection vehicle operating totally or partially in a traffic lane should be equipped with a truck/trailer mounted attenuator.
3. The shadow vehicle or protection vehicle may encroach into the traffic lane when the shoulder is too narrow to drive on.
4. If the work area does not move at least the Decision Sight Distance (**D**) every 15 minutes, the appropriate stationary layout should be used.
5. A compact work area should be maintained with minimum space allowed between work vehicles. When the work area extends beyond 500 feet in total length, other traffic control layouts should be considered.
6. This layout may be used for nighttime operations only in locations where the posted speed limit is 40 mph or less.
7. The Shadow Vehicle with flashing arrow board shall be used during nighttime operations.
8. Flaggers shall be used when the approach sight distance is restricted, the motorists can not see beyond the work area, or traffic volumes do not allow safe passage.



**LANE CLOSURE  
WITH A MOVING WORK AREA  
TWO-LANE TWO-WAY ROAD**

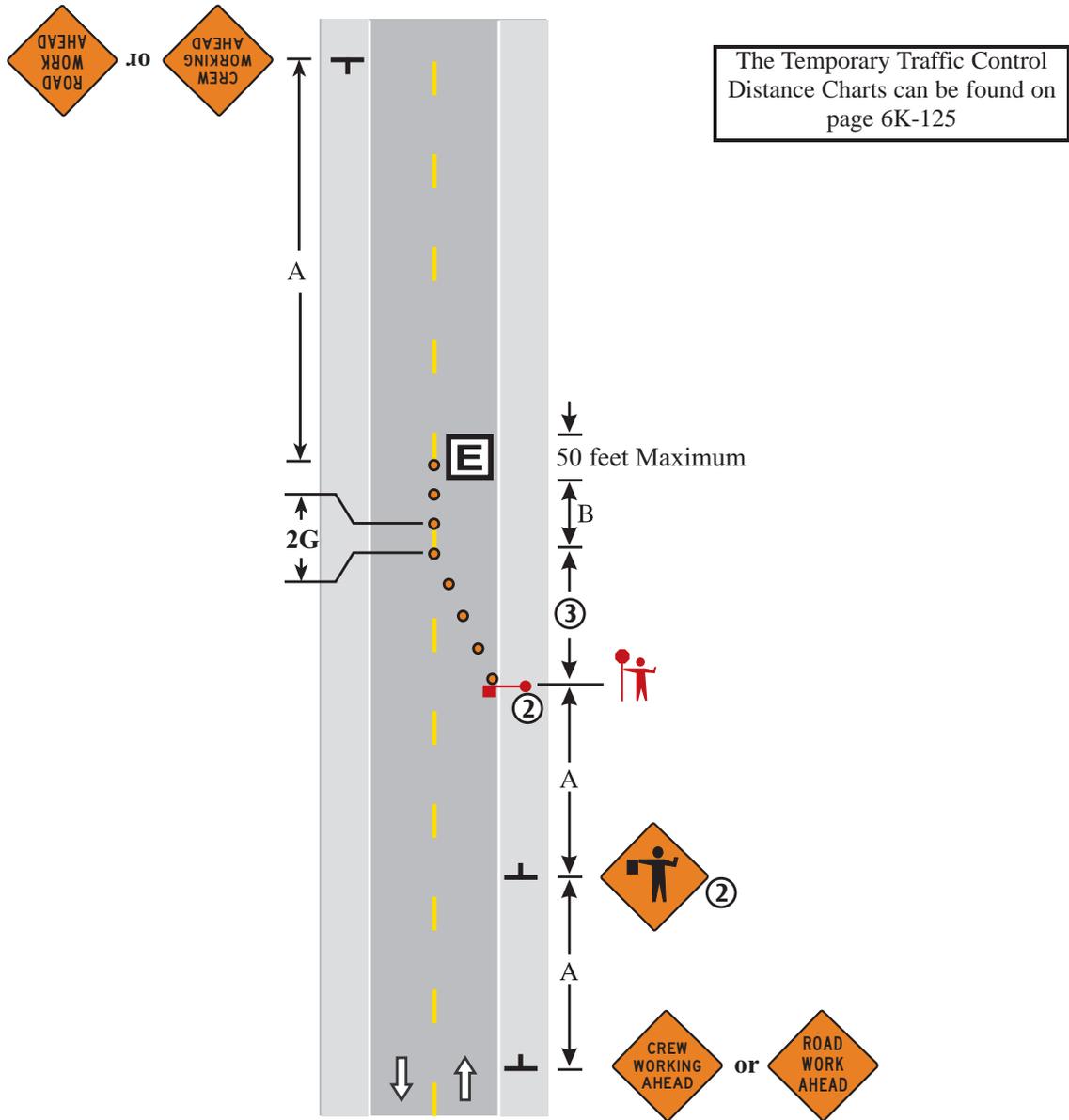
15 MINUTES or LESS

LAYOUT 7

NOTES:

1. The work vehicle shall not be parked on the shoulder opposite of the coned area.
2. The flagger and the Flagger Ahead symbol sign may be omitted when traffic volumes do not restrict traffic's ability to regulate itself through the length of the work space.
3. The two-way taper should be 50 feet in length using 5 equally spaced channelizing devices.

**USE FOR ROADS  
LESS THAN  
1500 ADT ONLY**



The Temporary Traffic Control Distance Charts can be found on page 6K-125

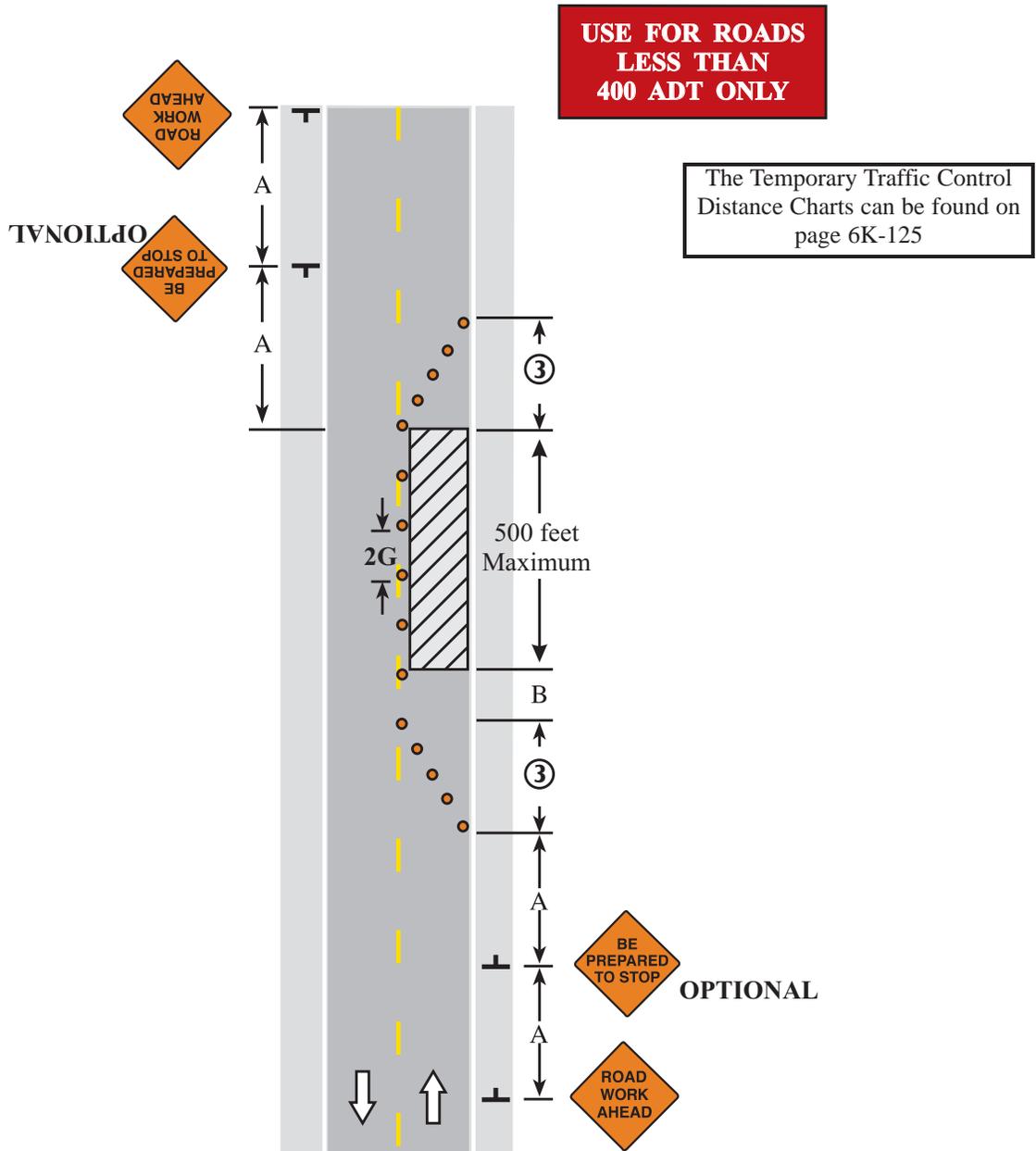
**EQUIPMENT IN TRAFFIC LANE  
TWO-LANE TWO-WAY ROAD**

1 HOUR or LESS

LAYOUT 8

NOTES:

1. When traffic can not regulate itself through the length of the work space, use Layout 10.
2. STOP signs shall be installed if the work space must be left unattended at night - see Layout 20.
3. The two-way taper should be 50 feet in length using 5 equally spaced channelizing devices.



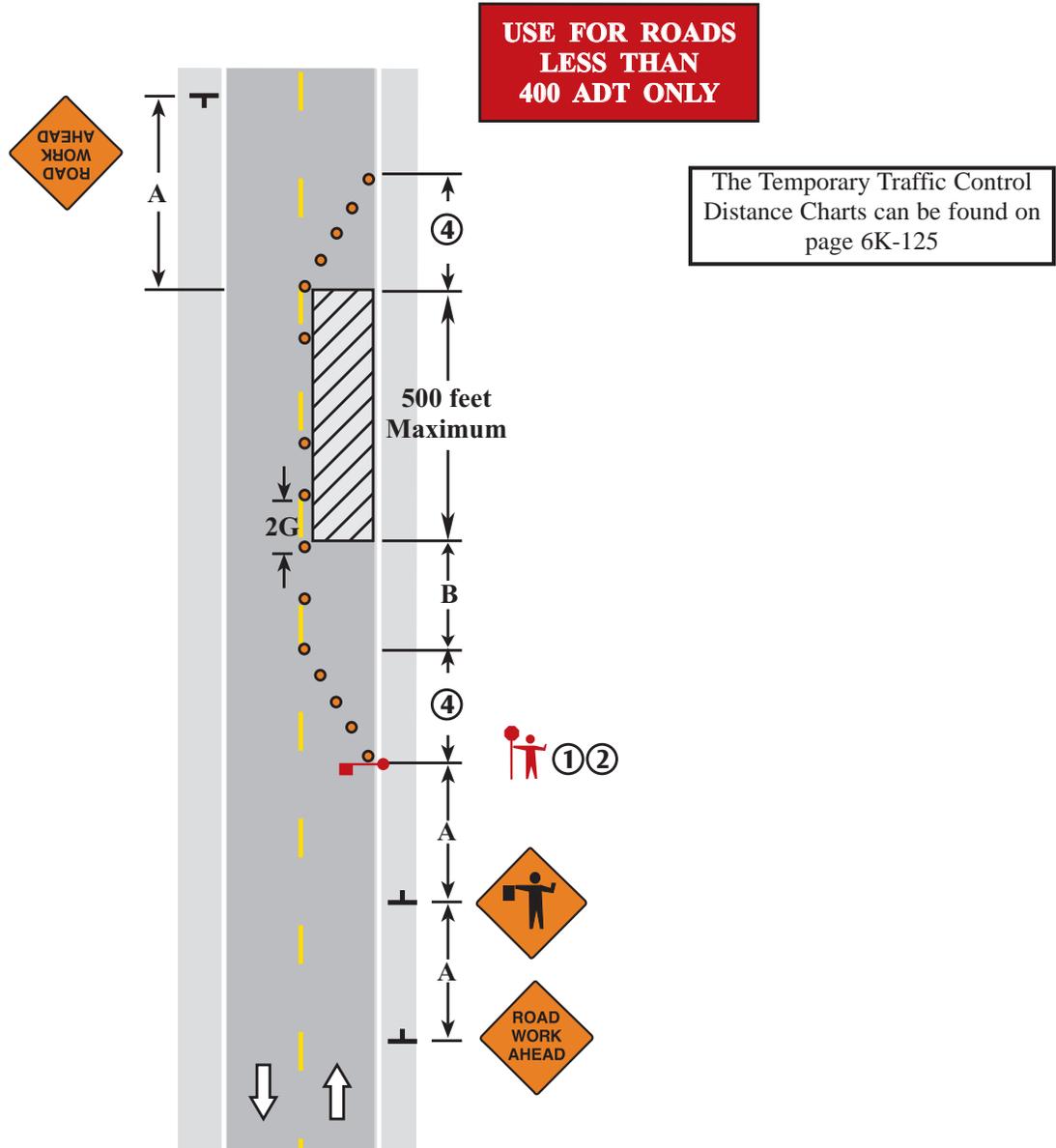
**LANE CLOSURE, NO FLAGGER  
TWO-LANE TWO-WAY ROAD**

12 HOURS or LESS

LAYOUT 9

NOTES:

1. The approach sight distance to the flagger shall be at least the Decision Sight Distance.
2. If the flagger's ability to see oncoming motorists beyond the work space is less than the Decision Sight Distance (**D**), two flaggers shall be used - See Layout 13.
3. STOP signs shall be installed if the work space must be left unattended at night - see Layout 20.
4. The two-way taper should be 50 feet in length using 5 equally spaced channelizing devices.



**LANE CLOSURE, ONE FLAGGER  
TWO-LANE TWO-WAY ROAD**

3 DAYS or LESS

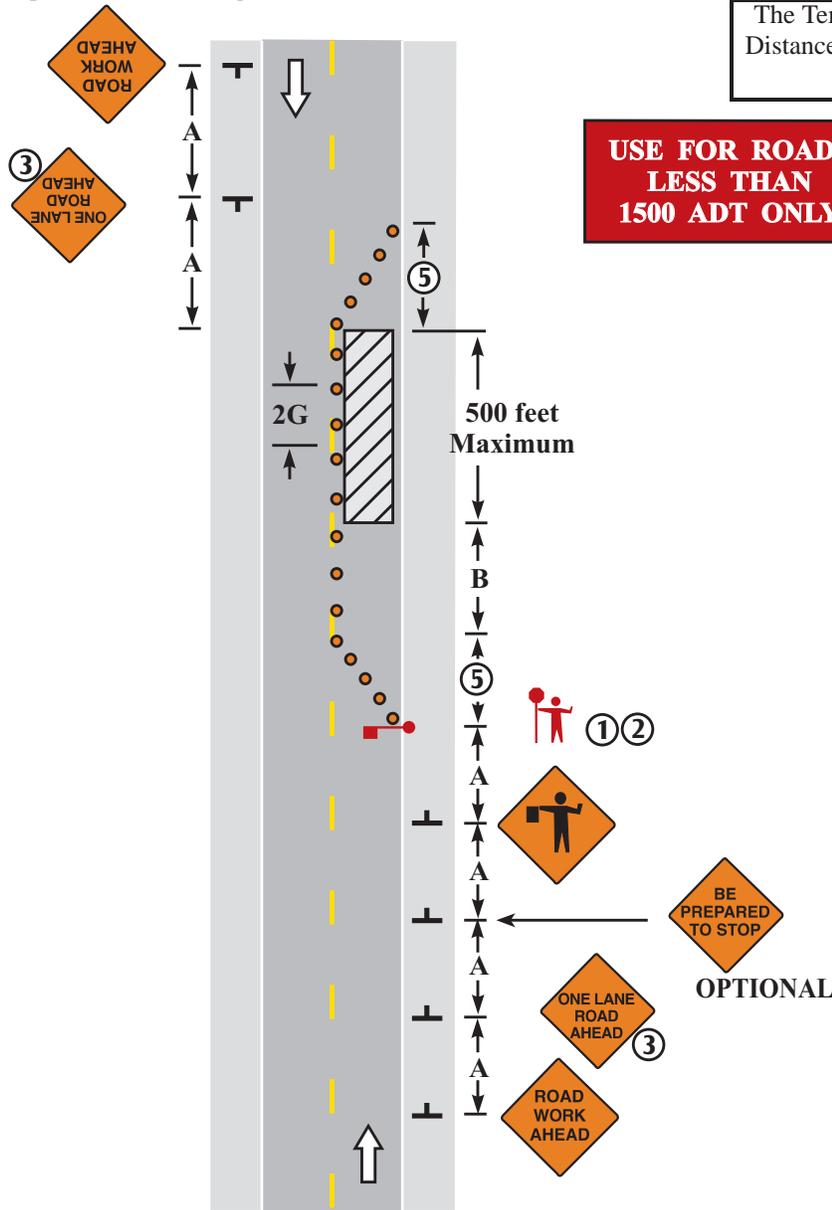
LAYOUT 10

NOTES:

1. The approach sight distance to the flagger shall be at least the Decision Sight Distance.
2. If the flagger's ability to see oncoming motorists beyond the work space is less than the Decision Sight Distance (**D**), two flaggers shall be used - See Layout 13.
3. The ONE LANE ROAD AHEAD sign may be omitted when the posted speed limit is 40 mph or less.
4. STOP signs shall be installed if the work space must be left unattended at night, - see Layout 20.
5. The two-way taper should be 50 feet in length and using five equally spaced channelizing devices.

The Temporary Traffic Control Distance Charts can be found on page 6K-125

**USE FOR ROADS LESS THAN 1500 ADT ONLY**



**LANE CLOSURE, ONE FLAGGER  
TWO-LANE TWO-WAY ROAD**

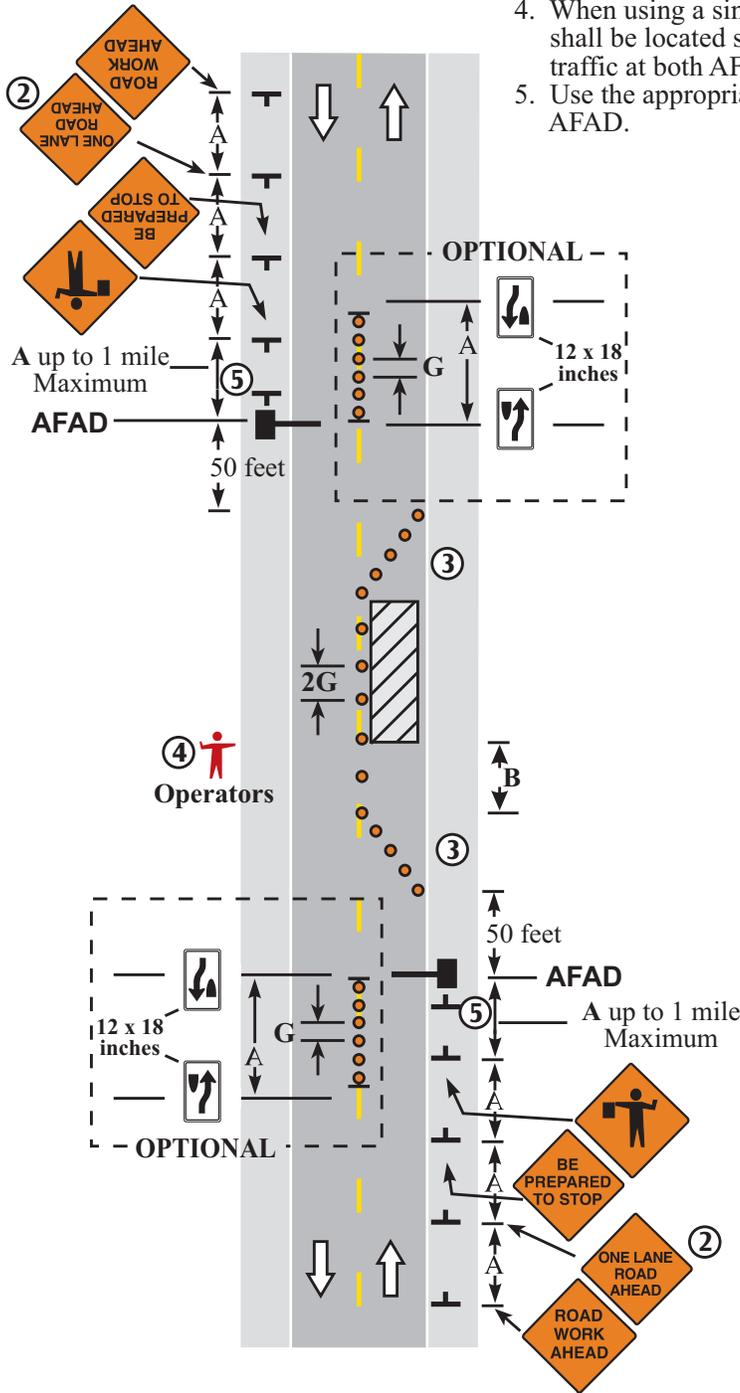
3 DAYS or LESS

LAYOUT 11

NOTES:

1. The approach sight distance to the Automated Flagging Assistance Device (AFAD) shall be at least the Decision Sight Distance (**D**).
2. The ONE LANE AHEAD sign may be omitted when the posted speed limit is 40 mph or less.
3. The two-way taper should be 50 feet in length using 5 equally spaced channelizing devices.

4. When using a single operator, they shall be located so they can see traffic at both AFAD locations.
5. Use the appropriate sign on the AFAD.



The Temporary Traffic Control Distance Charts can be found on page 6K-125

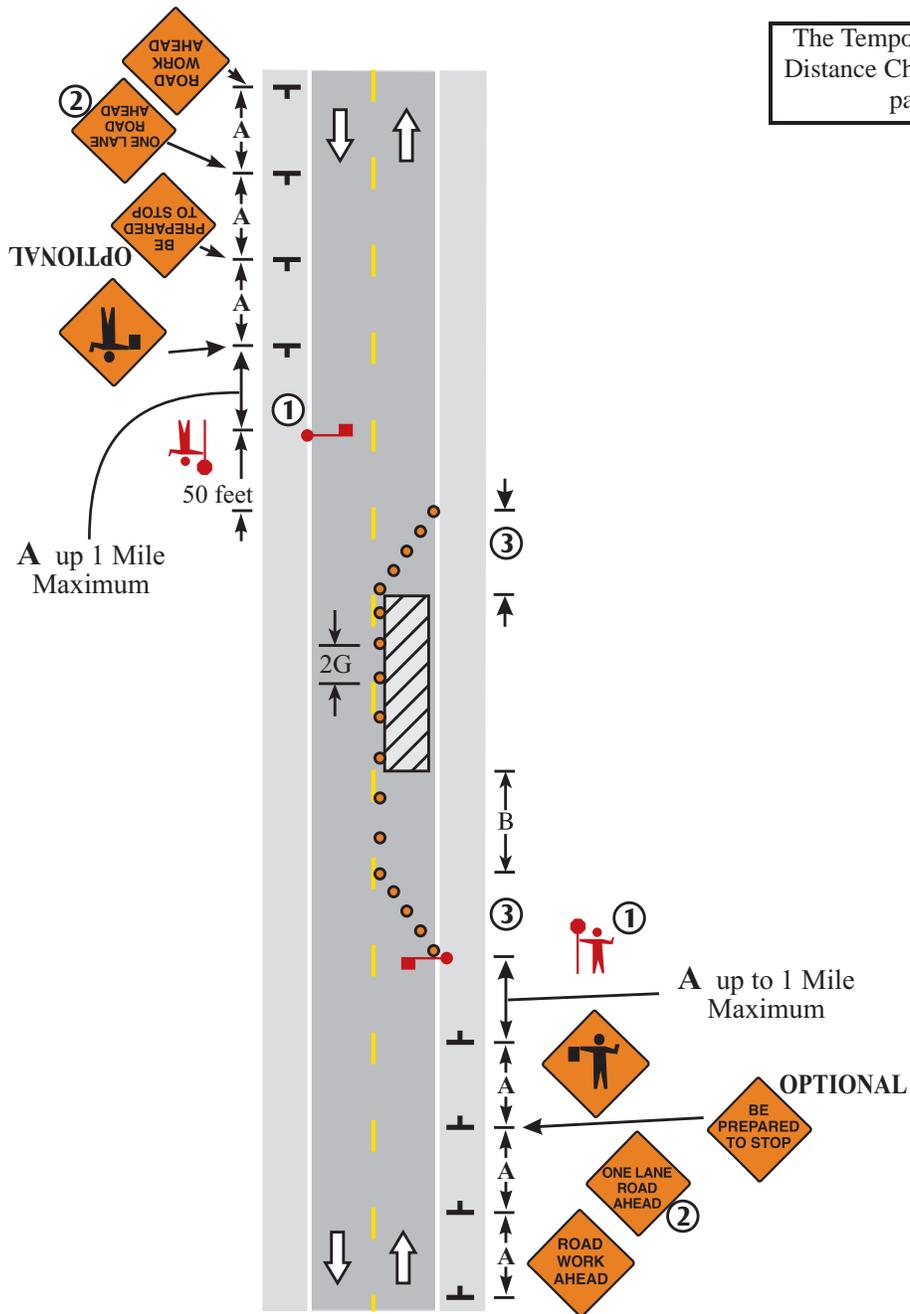
**LANE CLOSURE, AUTOMATED FLAGGERS  
TWO-LANE TWO-WAY ROAD**

3 DAYS or LESS

LAYOUT 12

NOTES:

1. The approach sight distance to the flagger shall be at least the Decision Sight Distance (**D**).
2. The ONE LANE ROAD AHEAD sign may be omitted when the posted speed limit is 40 mph or less.
3. The two-way taper should be 50 feet and using five equally spaced channelizing devices.



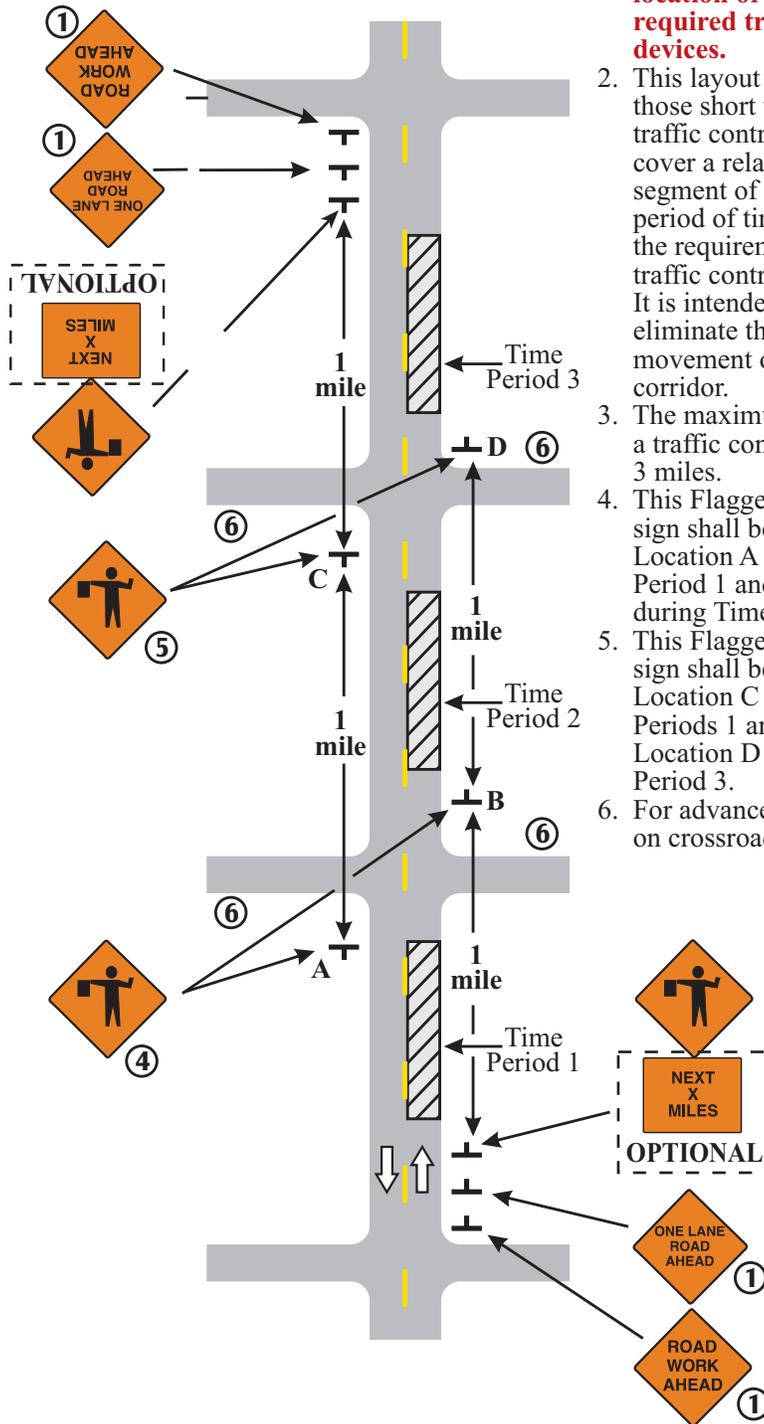
**LANE CLOSURE, TWO FLAGGERS  
TWO-LANE TWO-WAY ROAD**

3 DAYS or LESS

LAYOUT 13

NOTES:

1. **This layout shall be used with the appropriate flagger layout to select the location of additional required traffic control devices.**
2. This layout may be used for those short term stationary traffic control zones that cover a relatively long segment of highway in a short period of time but do not meet the requirements for a mobile traffic control zone. It is intended to be used to eliminate the multiple movement of signs along a corridor.
3. The maximum distance for a traffic control zone is 3 miles.
4. This Flagger Ahead symbol sign shall be used at Location A during Time Period 1 and at Location B during Time Periods 2 and 3.
5. This Flagger Ahead symbol sign shall be used at Location C during Time Periods 1 and 2 and at Location D during Time Period 3.
6. For advance warning signs on crossroads, see Layout 76.



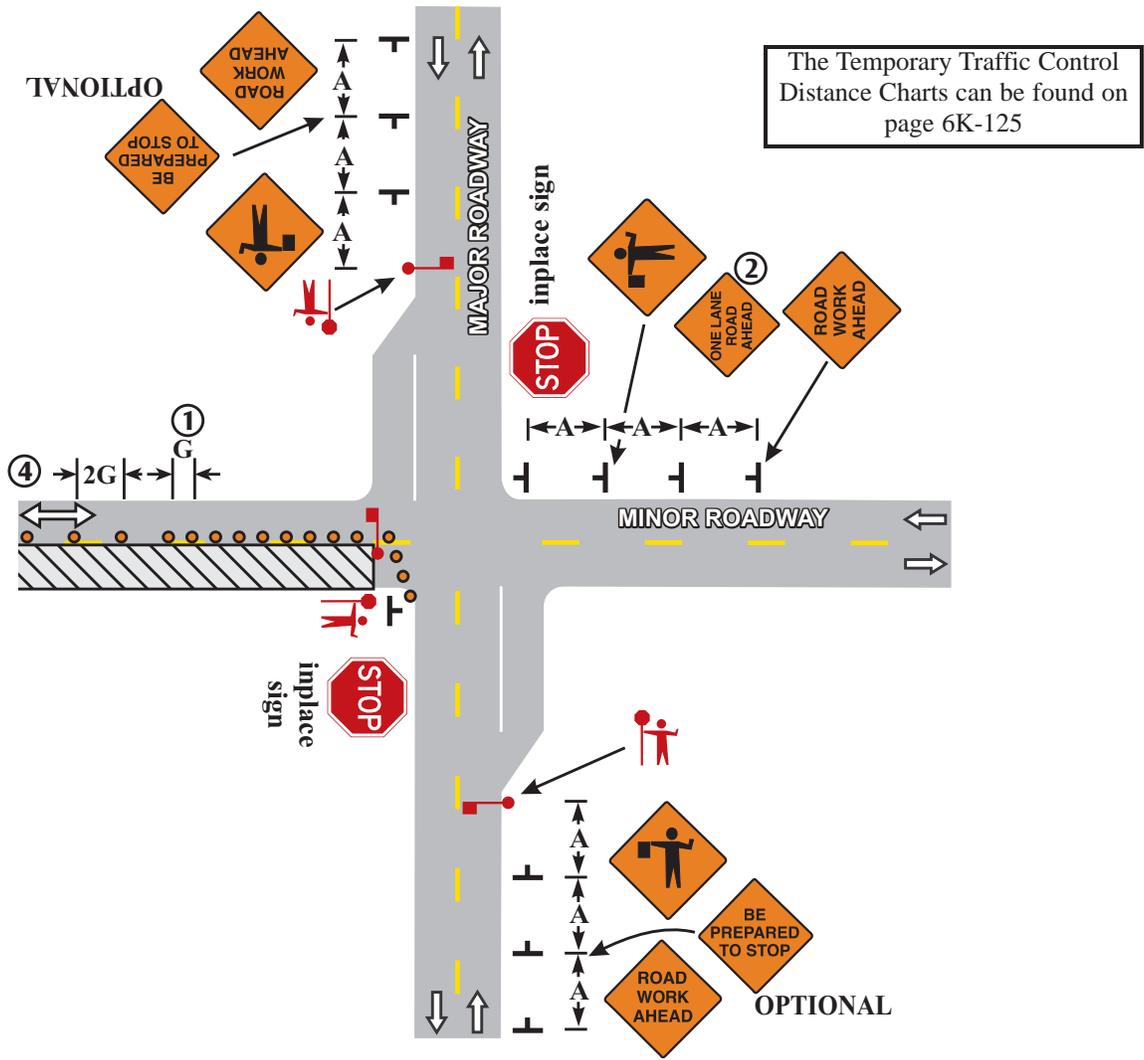
**MOVING WORK SPACES  
TRAFFIC CONTROL ZONE**

12 HOURS or LESS

LAYOUT 14

NOTES:

1. The spacing between devices should be reduced to **G** or less when the work space is within 300 feet of the intersection. This will help keep motorists from entering into the work space near the intersection.
2. The ONE LANE ROAD AHEAD sign may be omitted when the posted speed limit is 40 mph or less.
3. When the traffic volume of the minor road exceeds 1500 ADT or turning movements cause unsafe operations, the following steps should be considered:
  - a. Control the traffic at the intersection with a law enforcement officer;
  - b. Restrict vehicle turns from the major roadway with flagging, signing, and/or closing the turn lanes;
  - c. Completely close a leg of the minor roadway until the work space has left the area near the intersection. (Local traffic only)
4. For other temporary traffic control devices in advance of the work space, see Layouts 10, 11, or 13.



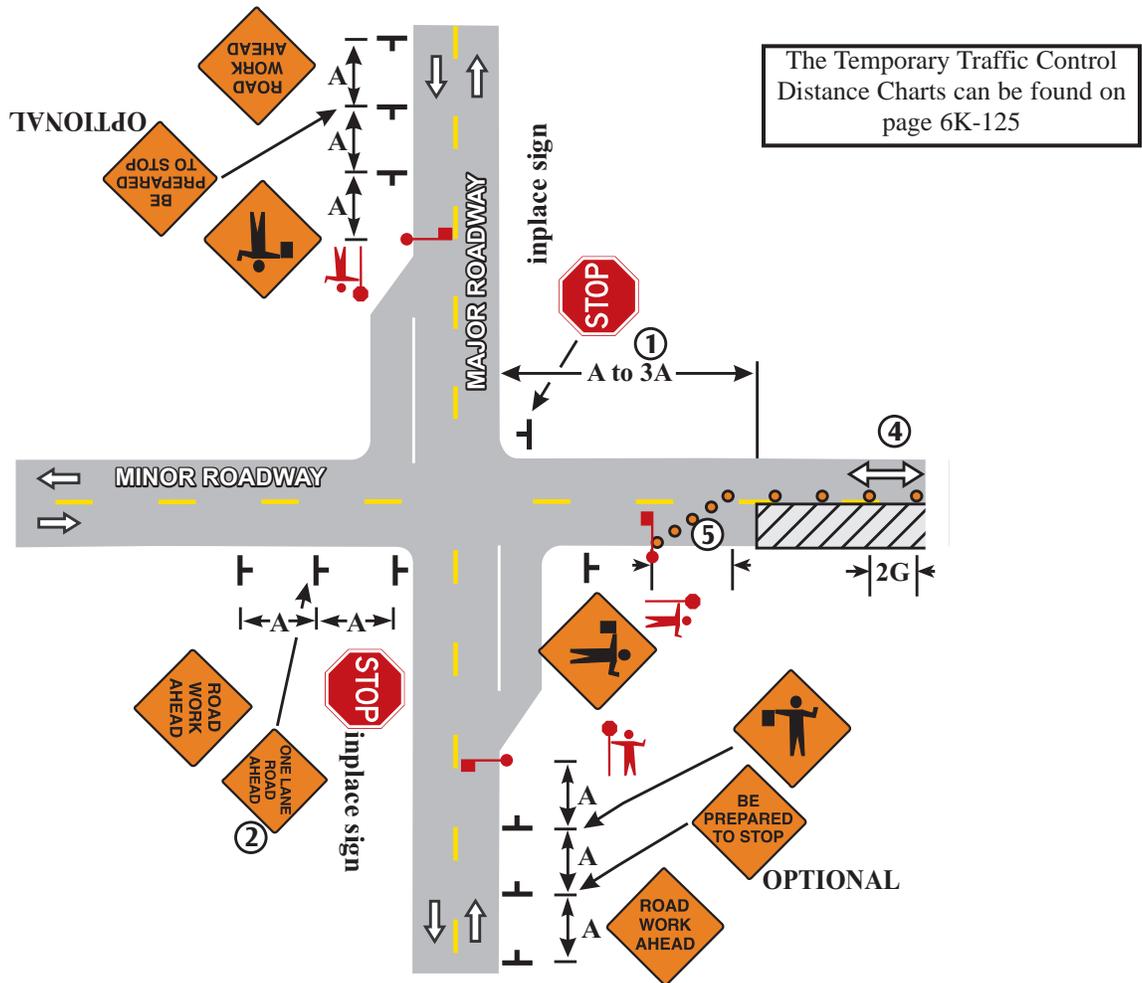
**LANE CLOSURE ON MINOR ROAD  
BEFORE INTERSECTION OF MAJOR ROAD  
TWO-LANE TWO-WAY ROAD**

3 DAYS or LESS

LAYOUT 15

NOTES:

1. When the work space is located between **A** and **3A** beyond a controlled intersection, the normal sign and buffer spacing in the approach area may be reduced during daylight operations. The Flagger sign should be centered between the flagger station and the intersection.
2. The ONE LANE ROAD AHEAD sign may be omitted when the posted speed is 40 mph or less.
3. When the traffic volume of the minor road exceeds 1500 ADT or turning movements cause unsafe operations, the following steps should be considered:
  - a. Control the traffic at the intersection with a law enforcement officer;
  - b. Restrict vehicle turns from the major roadway with flagging, signing, and/or closing the turn lanes; or
  - c. Completely close a leg of the minor roadway until the work space has left the area near the intersection. (Local traffic only)
4. For other temporary traffic control devices in advance of the work space, see Layouts 10, 11, or 13.
5. The two-way taper should be 50 feet in length using five equally spaced channelizing devices.



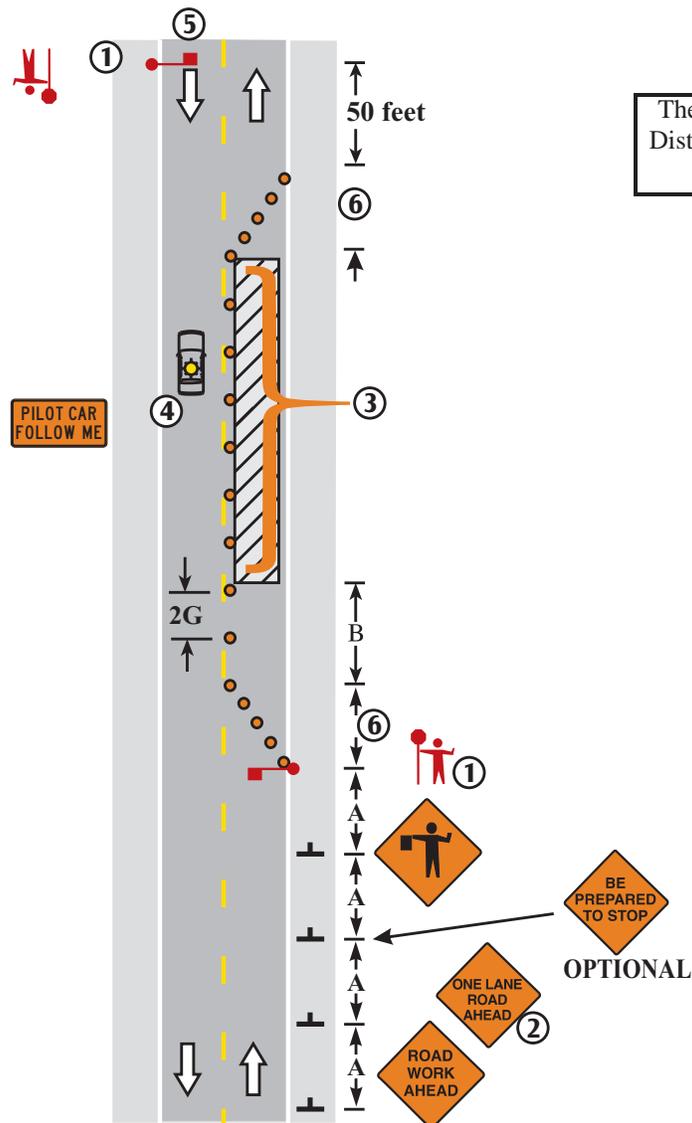
**LANE CLOSURE ON MINOR ROAD  
BEYOND INTERSECTION OF MAJOR ROAD  
TWO-LANE TWO-WAY ROAD**

3 DAYS or LESS

LAYOUT 16

NOTES:

1. The approach sight distance to the flagger shall be at least the Decision Sight Distance (**D**).
2. The ONE LANE ROAD AHEAD sign may be omitted when the posted speed limit is 40 mph or less.
3. Channelizing devices along the edge of the work space may be omitted unless:
  - a. Traffic is traveling next to longitudinal drop-offs that are greater than 4 inches, or
  - b. Visibility of the open traveled lane is restricted.
4. Pilot cars should lead traffic through the work zone at a safe speed. See the *Flagger Handbook* for additional guidance.
5. Advance warning signs are the same for both directions approaching the work area.
6. The two-way taper should be 50 feet in length using five equally spaced channelizing devices.



**LANE CLOSURE, PILOT CAR METHOD  
TWO-LANE TWO-WAY ROAD**

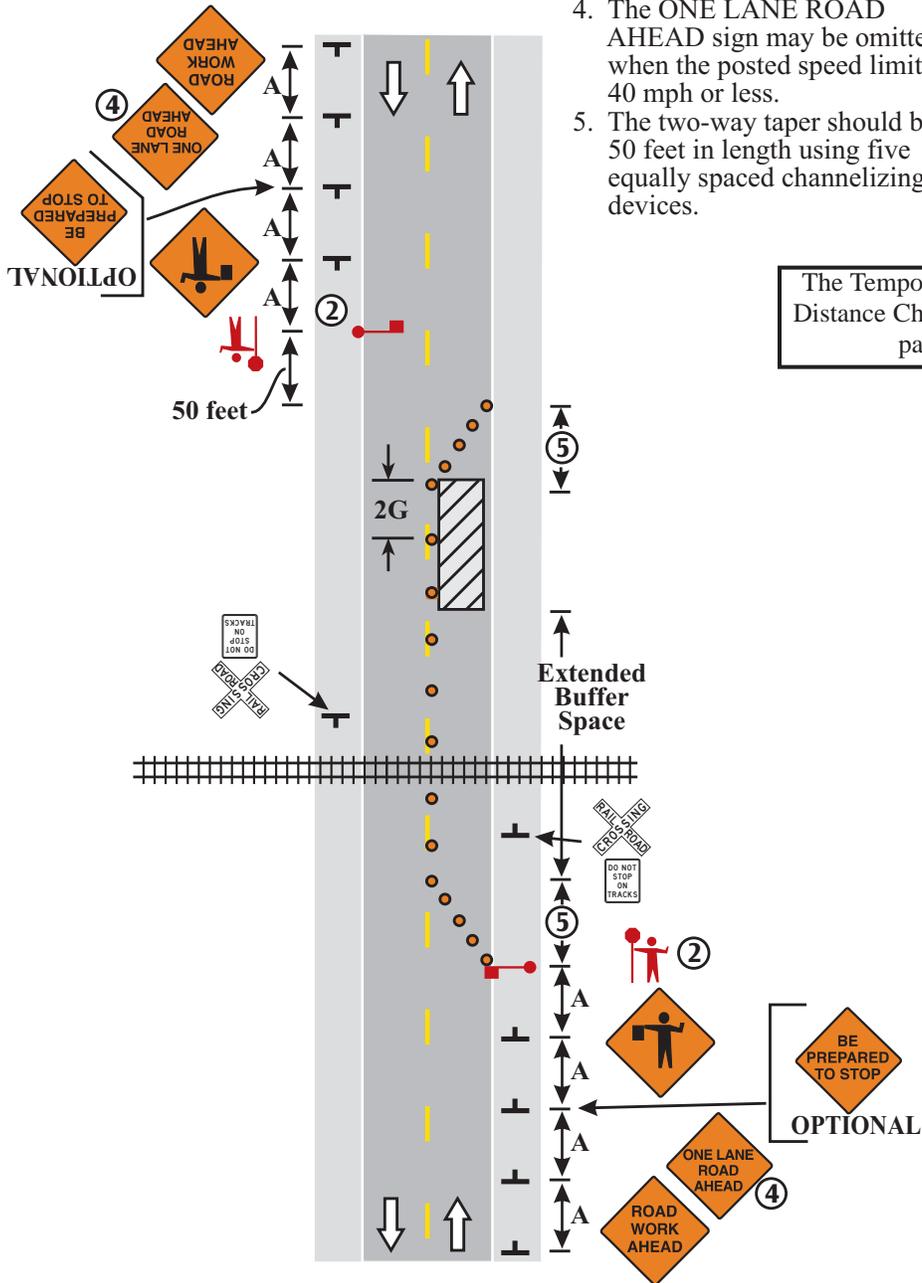
3 DAYS or LESS

LAYOUT 17

NOTES:

1. If the backup of vehicles across active railroad tracks cannot be avoided, a law enforcement officer or a flagger shall be provided at the crossing to prevent vehicles from stopping within the railroad crossing even if automatic warning devices are in place.
2. The approach sight distance to the flagger shall be at least the Decision Sight Distance (**D**).
3. The activity area should be extended beyond the railroad crossing so that the backup of traffic created by the flagging operation will not extend across the railroad crossing.

4. The ONE LANE ROAD AHEAD sign may be omitted when the posted speed limit is 40 mph or less.
5. The two-way taper should be 50 feet in length using five equally spaced channelizing devices.



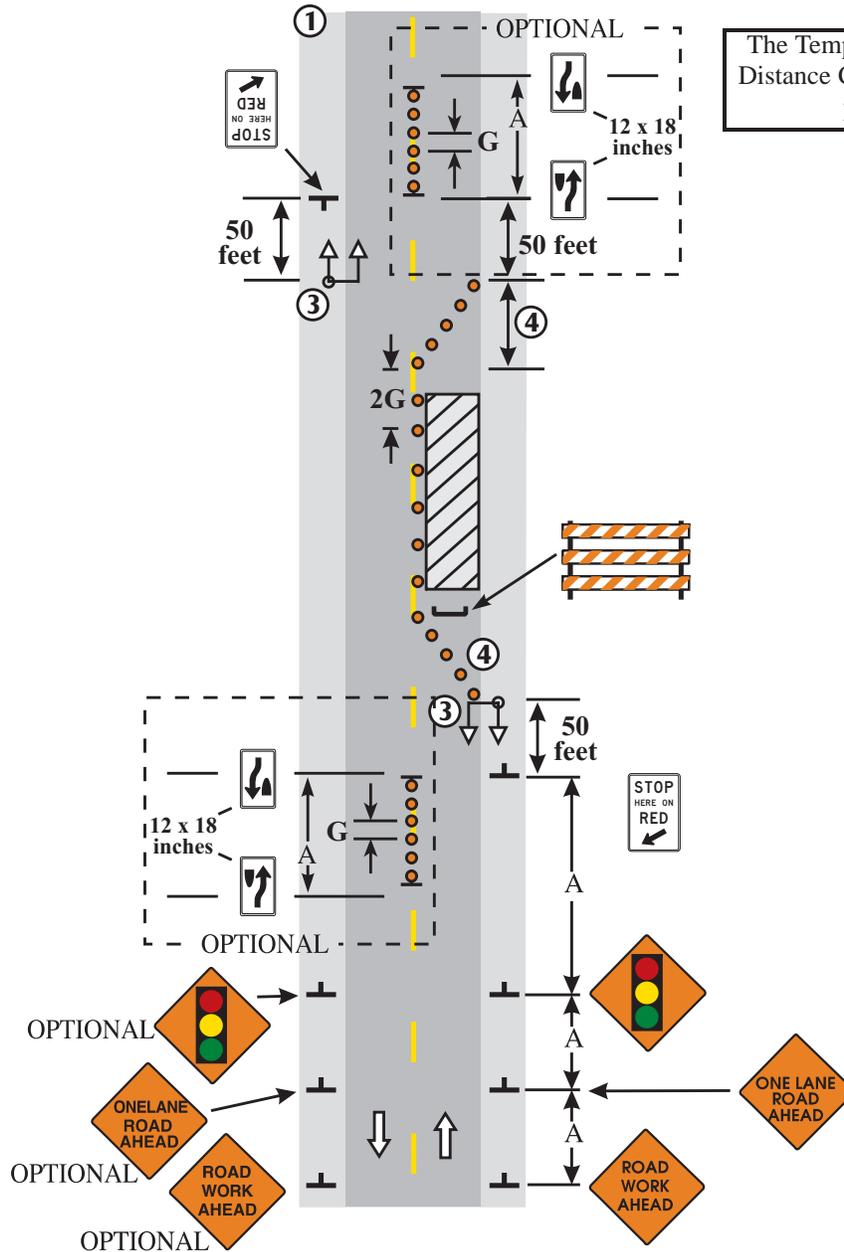
**LANE CLOSURE NEAR GRADE CROSSING  
TWO-LANE TWO-WAY ROAD**

3 DAYS or LESS

LAYOUT 18

NOTES:

1. Approach signs are the same in both directions.
2. Signal timing and signal head locations shall be established by qualified personnel and approved by the local road authority.
3. Two signal heads shall be installed per approach. The first shall be installed on the right shoulder. The second signal head may be installed on either the left shoulder or mounted over head on the same structure as the first signal head.
4. The two-way taper should be 50 feet in length using five equally spaced channelizing devices.



**LANE CLOSURE WITH PORTABLE SIGNALS  
TWO-LANE, TWO-WAY ROAD**

3 DAYS or LESS

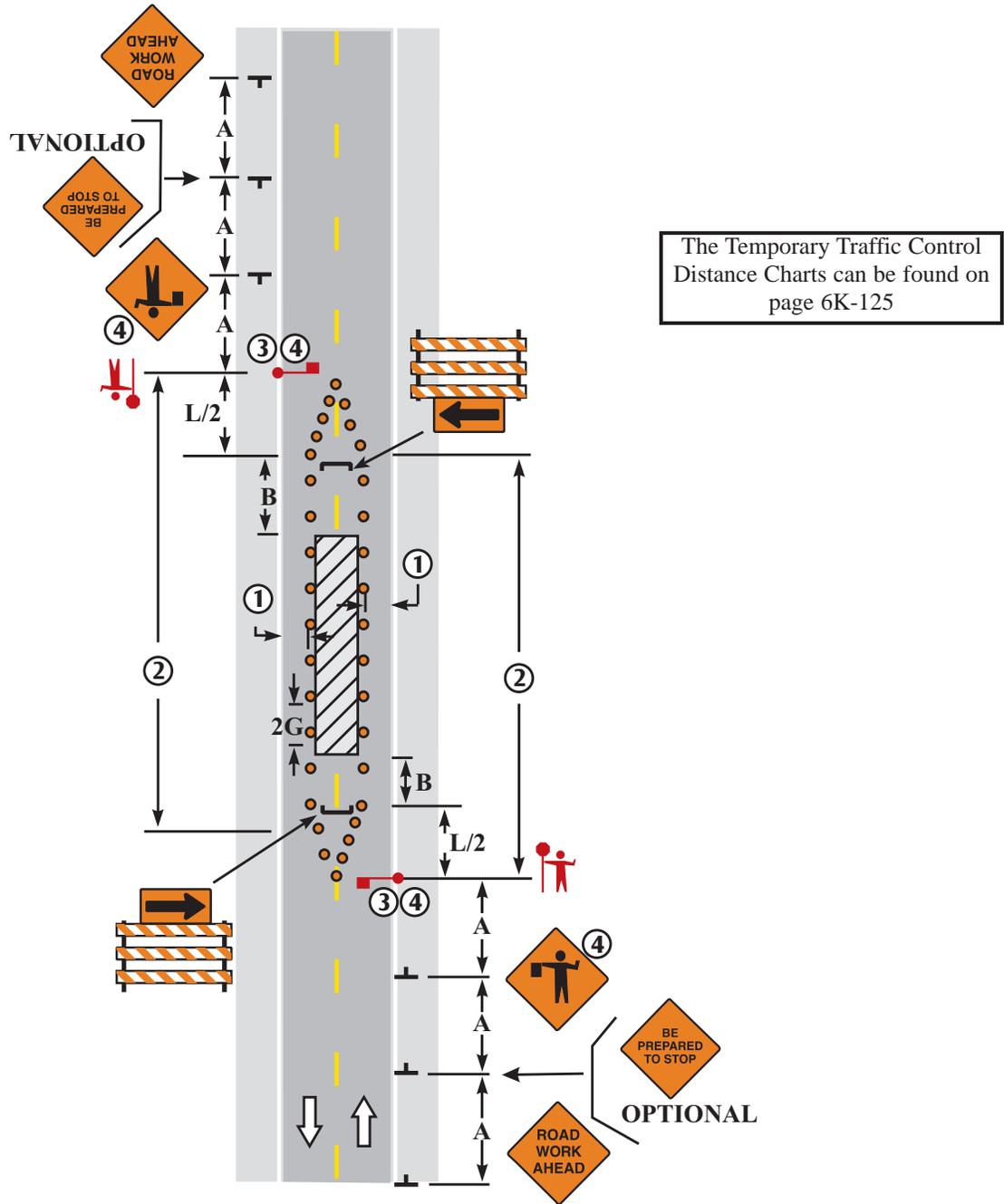
LAYOUT 19





NOTES:

1. Minimum paved lane width from the channelizing devices to the edge of pavement or outside edge of the shoulder shall be 10 feet.
2. Parking and stopping may be prohibited along the work area and tapers.
3. The flagger shall be visible for at least the Decision Sight Distance (**D**).
4. The flaggers and Flagger Ahead signs may be omitted if the posted speed limits is 40 mph or less.



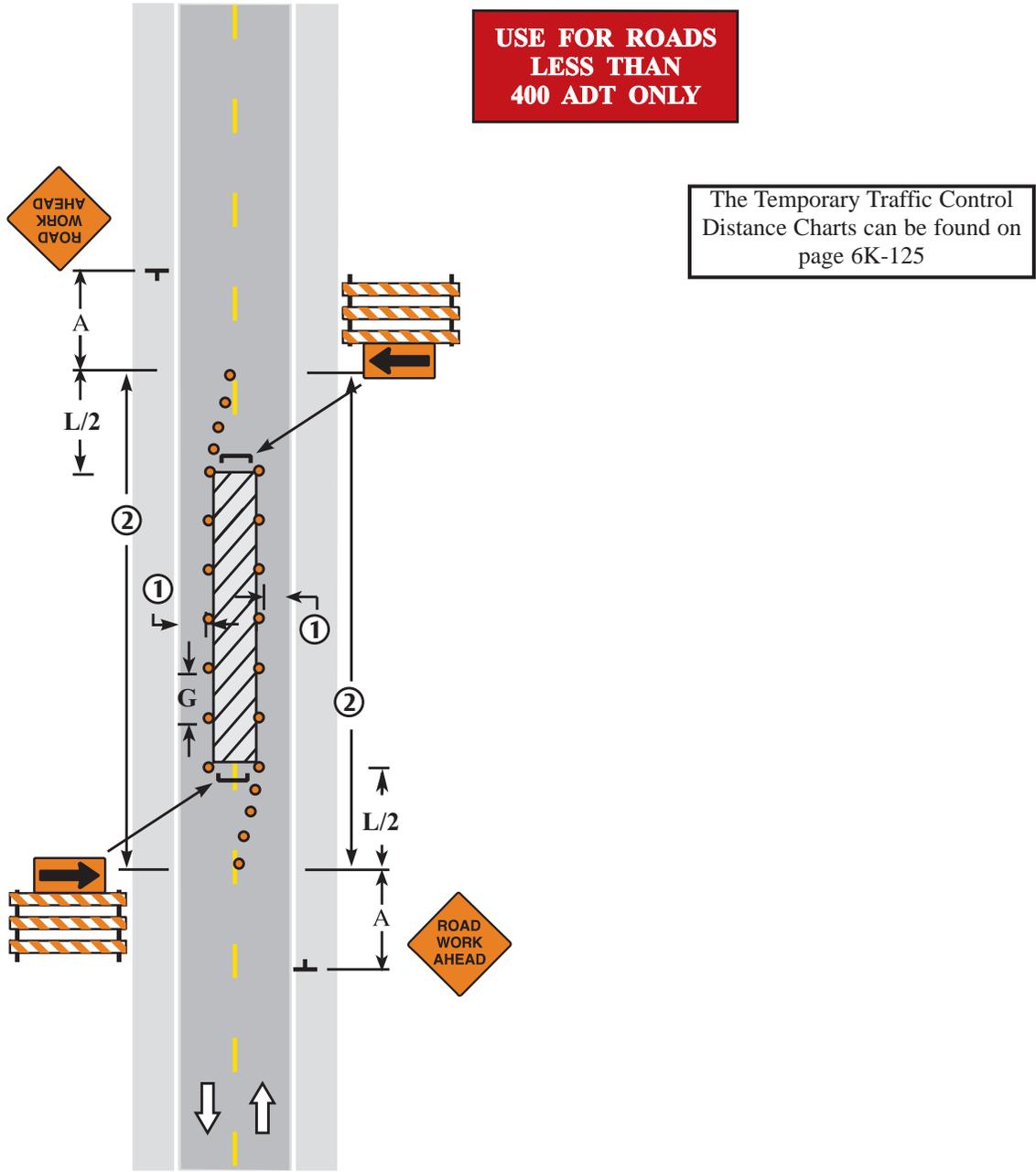
**WORK SPACE IN CENTER OF ROAD  
TWO-LANE TWO-WAY ROAD**

12 HOURS or LESS

LAYOUT 22

NOTES:

1. Minimum paved lane width from the channelizing devices to the edge of pavement or outside edge of the shoulder shall be 10 feet.
2. Parking and stopping may be prohibited along the work area and tapers.



**WORK SPACE IN CENTER OF ROAD  
TWO-LANE TWO-WAY ROAD**

3 DAYS or LESS

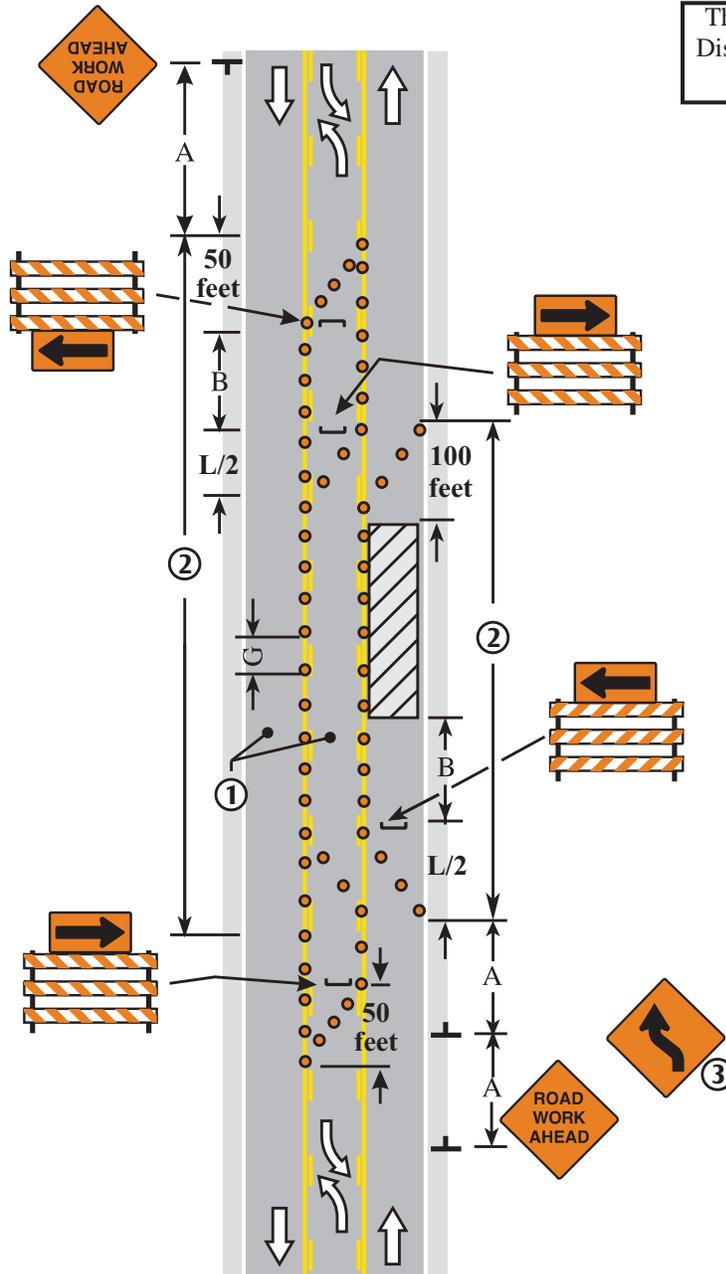
LAYOUT 23



NOTES:

1. The minimum paved lane width from channelizing devices to edge of pavement or outside edge of paved shoulder or face of curb shall be 10 feet.
2. Parking, stopping, and left turning movements may be prohibited along the work space and taper.
3. The Lane Shift symbol sign may be omitted when the posted speed limit is 40 mph or less.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**LANE CLOSURE  
TWO-LANE TWO-WAY ROAD  
WITH TWO WAY LEFT TURN LANE**

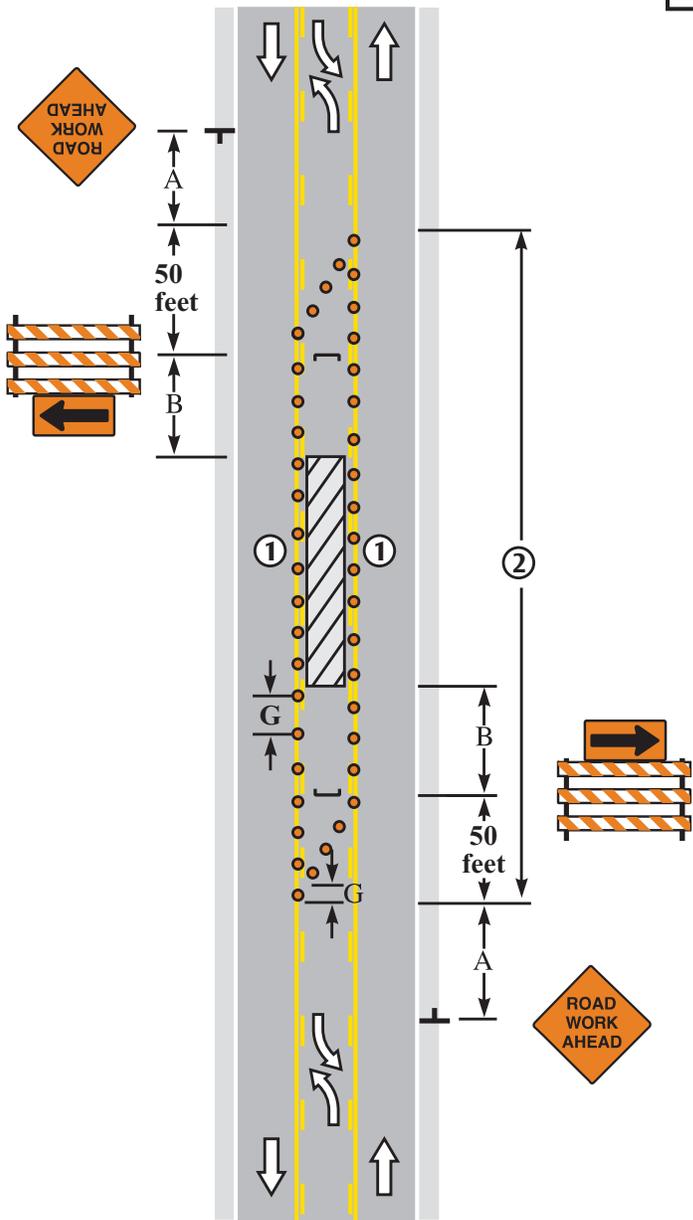
3 DAYS or LESS

LAYOUT 25

NOTES:

1. The minimum paved lane width from channelizing devices to edge of pavement or outside edge of paved shoulder or face of curb shall be 10 feet.
2. Parking, stopping, and left turning movements may be prohibited along the work space and taper.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**TURN LANE CLOSURE  
TWO-LANE TWO-WAY ROAD  
WITH TWO WAY LEFT TURN LANE**

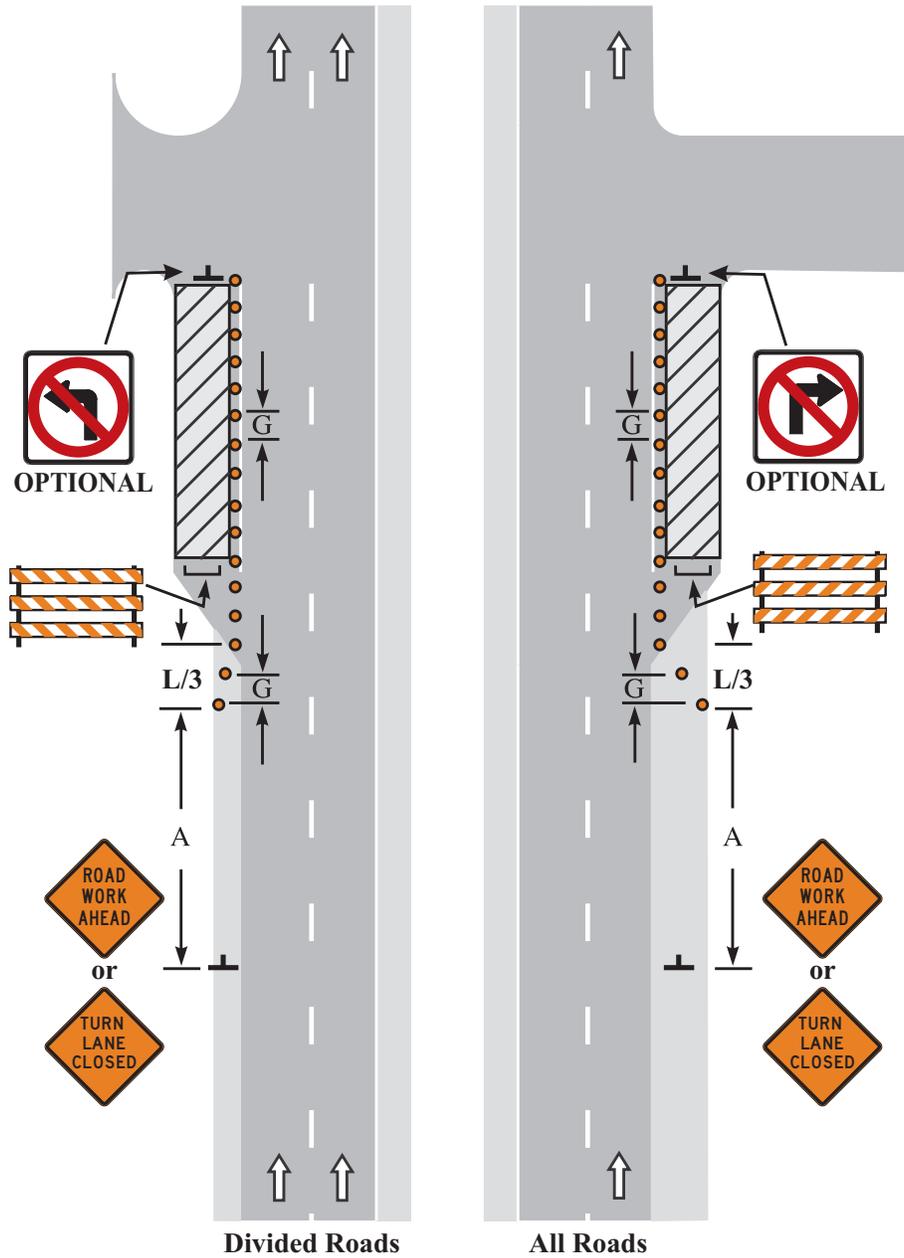
3 DAYS or LESS

LAYOUT 26

NOTES:

1. Contact the appropriate road authority for signal timing modifications before beginning work at any signalized intersection.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



### TURN LANE CLOSURES

3 DAYS or LESS

LAYOUT 27

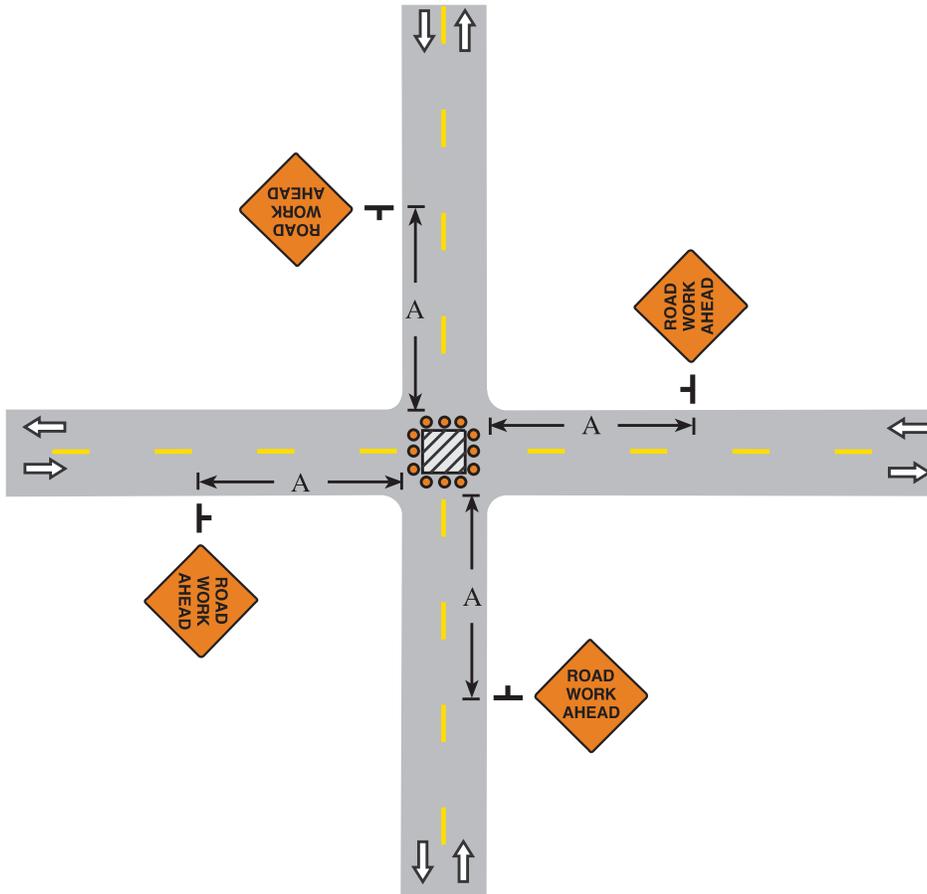
NOTES:

1. The minimum paved lane width from channelizing devices to the edge of the pavement or to the outside edge of the shoulder shall be 10 feet.

The Temporary Traffic Control Distance Charts can be found on page 6K-125

**USE FOR ROADS  
LESS THAN  
400 ADT ONLY**

**ONLY FOR  
SPEED LIMITS  
40 MPH  
OR LESS**



**CLOSURE IN CENTER OF INTERSECTION**

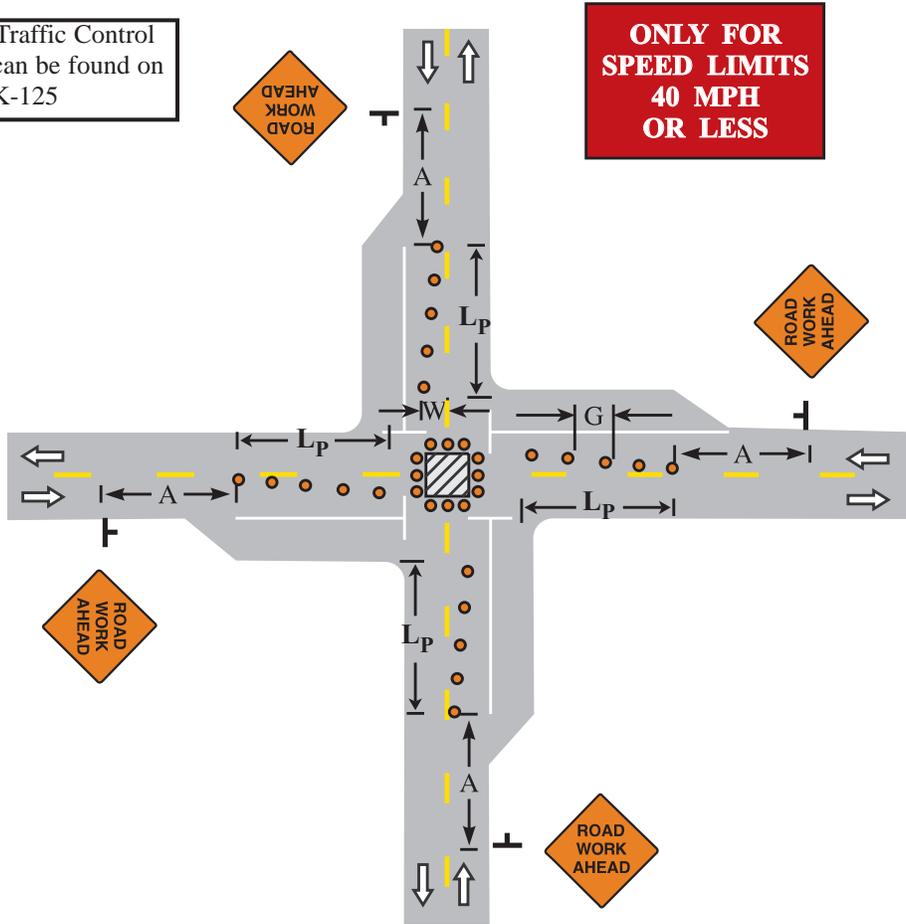
3 DAYS or LESS

LAYOUT 28

NOTES:

1. Contact the appropriate road authority for signal timing modifications before beginning work at any signalized intersection.
2. The minimum paved lane width from channelizing devices to the edge of the pavement or to the outside edge of the shoulder shall be 10 feet.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



Posted Speed Limit Prior to Work Starting (mph)	
0 - 30	G=25 ft
35 - 40	

Partial Lane Closure Taper Lengths based on encroachment distance into the lane (W) (Lp)					
	feet	feet	feet	feet	feet
W	2	4	6	8	10
Lp	50	75	100	125	150
	75	100	175	225	300

**CLOSURE IN CENTER OF INTERSECTION**

3 DAYS or LESS

LAYOUT 29

**This page has been intentionally left blank.  
There is no Layout 30**

**Multi-Lane  
Undivided**

# Multi-Lane Undivided

A road having two or more lanes of traffic traveling in the same direction with no physical barriers separating the opposing traffic lanes.



# MULTI-LANE UNDIVIDED ROADS

The Temporary Traffic Control Distance Charts can

	MOBILE	SHORT DURATION	SHORT TERM	INTERMEDIATE TERM
	15 Minutes or Less	One Hour or Less	12 Hours or Less	3 Days or Less
Work on Shoulder	1		2, 4	
Work off Shoulder	2			
Parking Lane Closure	3			
Lane Closures				
Mobile	31			
Near Intersection	32	26, 36, 40, 42 43		
Left Lane	34, 35, 36			
Right Lane	33*		39, 40	
Turn Lane	26, 43			
Double Lane	41, 42			
Two Way Left Turn Lanes				
Left Lane Closure	37, 38			
Road Closure	82			
Sidewalk Closure	84, 85			

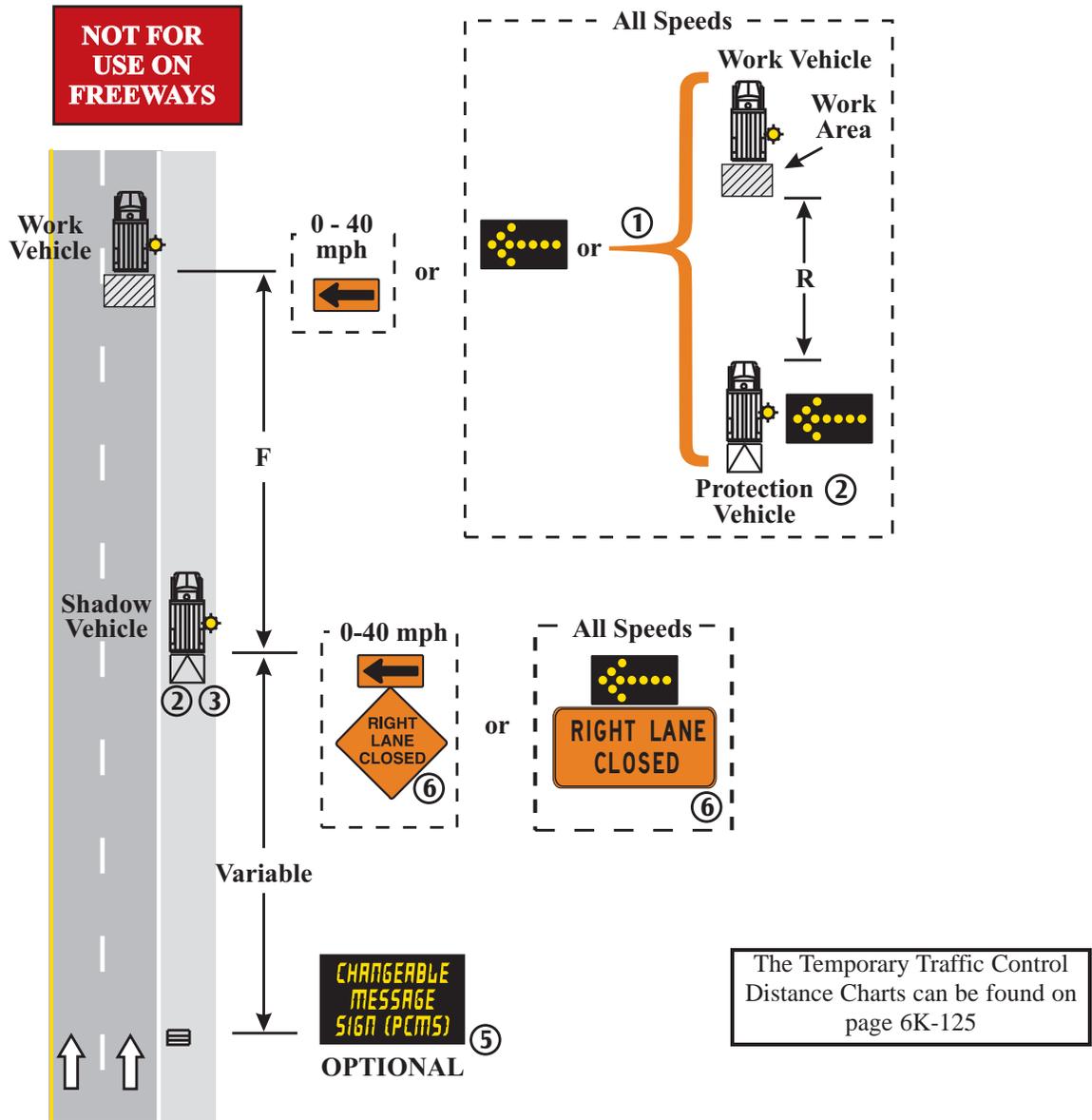
\* **NOTE:** Low Speed, Intermediate Volume Roads Only.

These Layouts as well as the entire Field Manual, the Flagging Handbook and other documents are available on the Mn/DOT, Traffic Engineering website at:

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**NOTES:**

1. A work vehicle without a flashing arrow board shall be followed by a protection vehicle at a distance of **R**. The protecting vehicle shall be equipped with a flashing arrow board and should have a truck mounted attenuator.
2. Any shadow vehicle operating totally or partially in a traffic lane should be equipped with a truck mounted attenuator.
3. The Shadow Vehicle may encroach into the traffic lane.
4. If the operation does not move at least the Decision Sight Distance (**D**) every 15 minutes, the appropriate stationary layout should be used.
5. If this layout is used for nighttime operations, the PCMS shall be used.
6. The RIGHT LANE CLOSED sign may be omitted when the PCMS is used.



**MOBILE LANE CLOSURE  
MULTI-LANE ROAD**

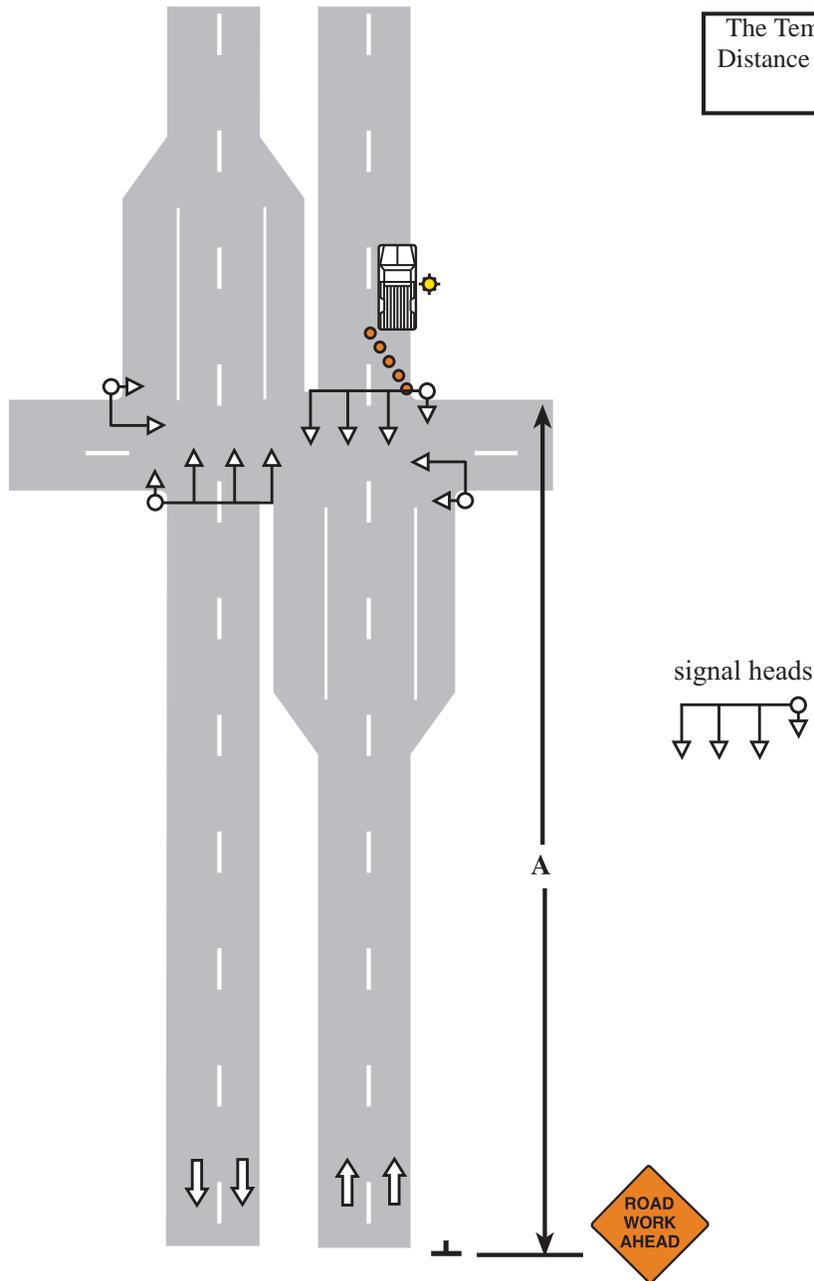
15 MINUTES or LESS

LAYOUT 31

**NOTES:**

1. The operation shall not remain in one location for more than 15 minutes.
2. There should be little or no encroachment into the cross-street traffic path
3. The traffic control signal should be put in an ALL-RED flash mode to facilitate traffic control at the work site. If the intersection flashes YEL-RED, the appropriate stationary layout shall be used.
4. If the work space is not visible for at least the Decision Sight Distance (**D**), the appropriate stationary layout shall be used.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**LANE CLOSURE  
FAR SIDE OF SIGNALIZED INTERSECTION**

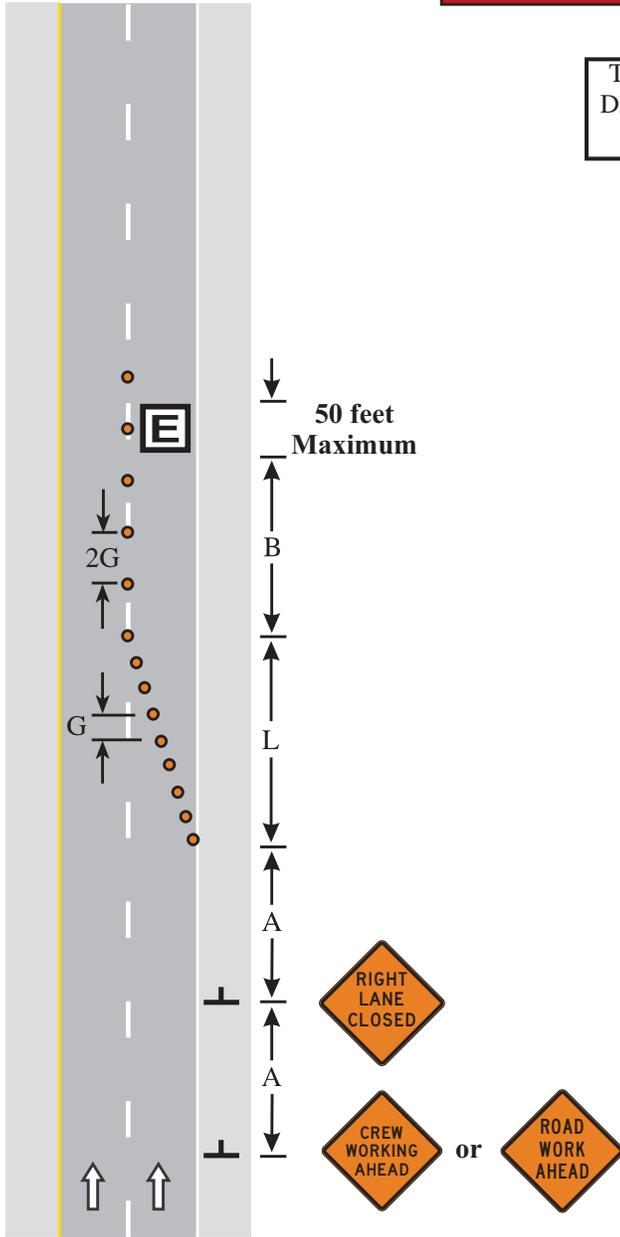
15 MINUTES or LESS

LAYOUT 32

**USE FOR ROADS  
LESS THAN  
1500 ADT ONLY**

**ONLY FOR  
SPEED LIMITS  
40 MPH  
OR LESS**

The Temporary Traffic Control  
Distance Charts can be found on  
page 6K-125



**EQUIPMENT IN TRAFFIC LANE  
MULTI-LANE ROAD**

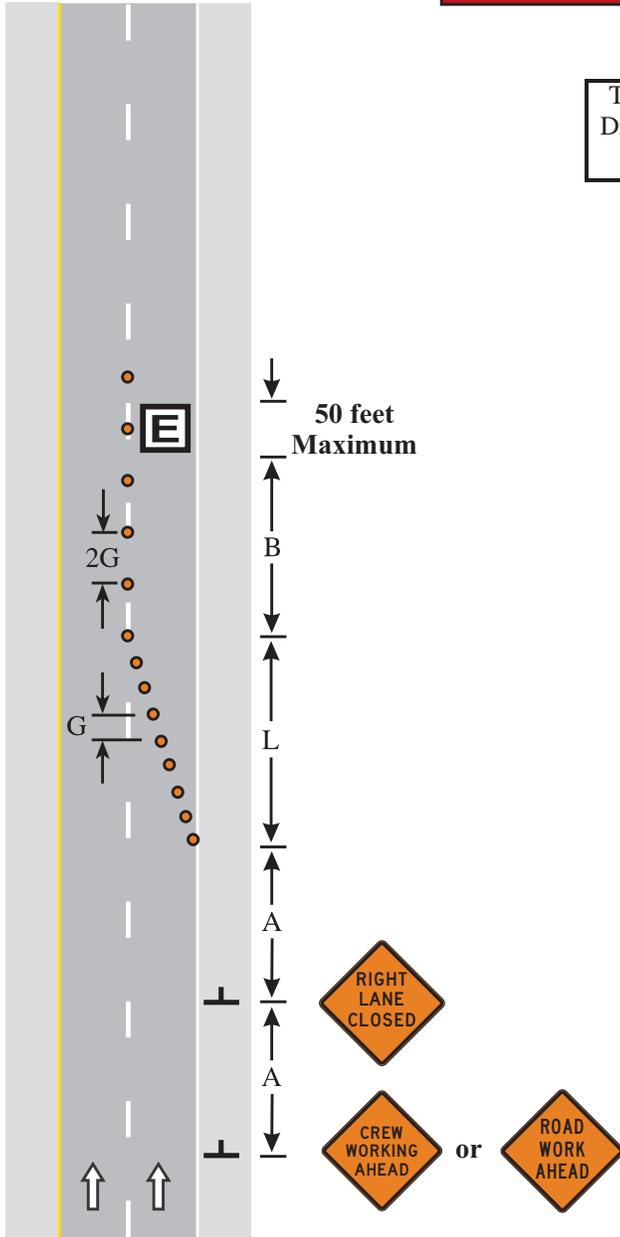
1 HOUR or LESS

LAYOUT 33

**USE FOR ROADS  
LESS THAN  
1500 ADT ONLY**

**ONLY FOR  
SPEED LIMITS  
40 MPH  
OR LESS**

The Temporary Traffic Control  
Distance Charts can be found on  
page 6K-125



**EQUIPMENT IN TRAFFIC LANE  
MULTI-LANE ROAD**

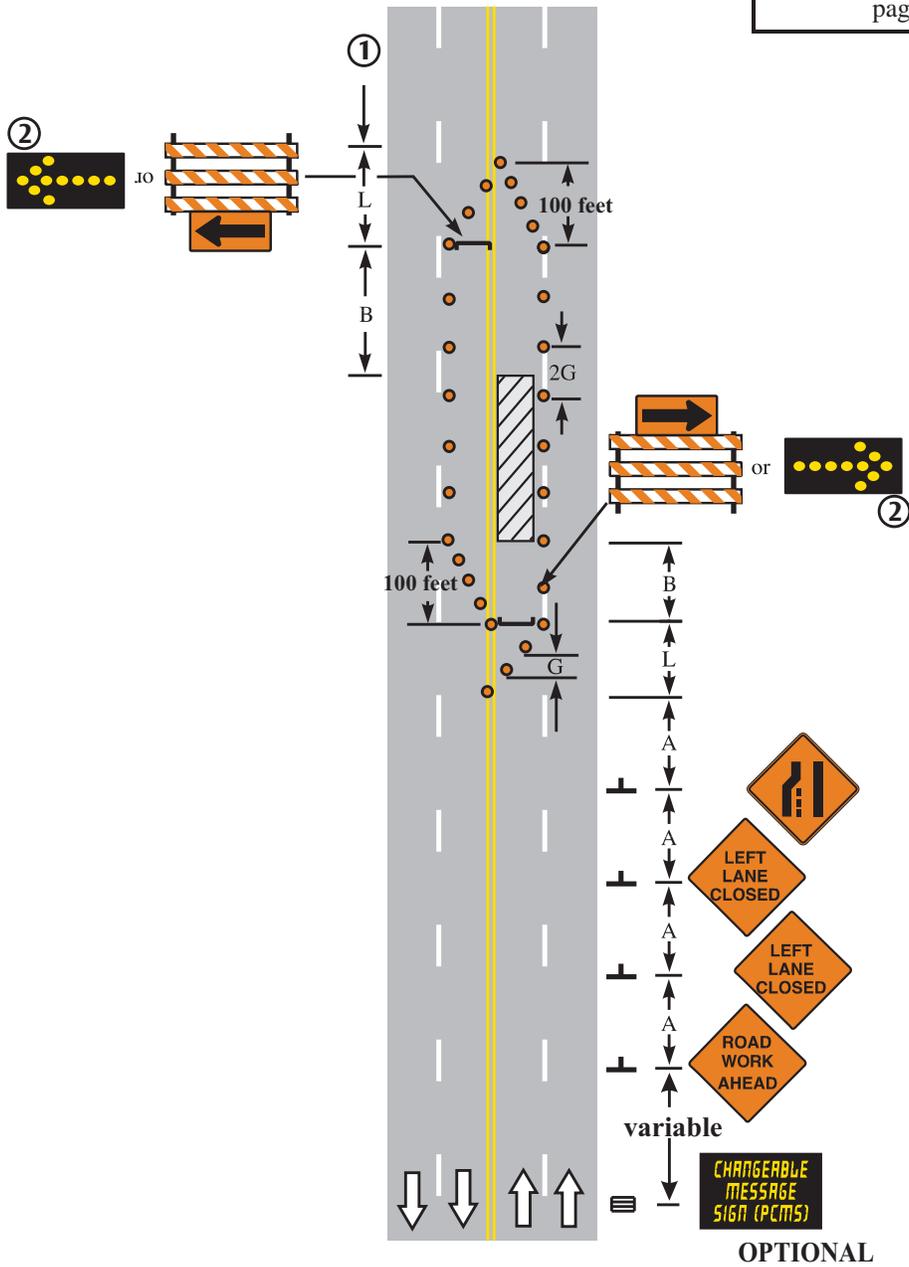
1 HOUR or LESS

LAYOUT 33

NOTES:

1. The advance warning sign sequence is shown for one way direction only. Signing from the other direction shall be identical.
2. The flashing arrow panel shall be used where the posted speed limit is 45 mph or greater.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



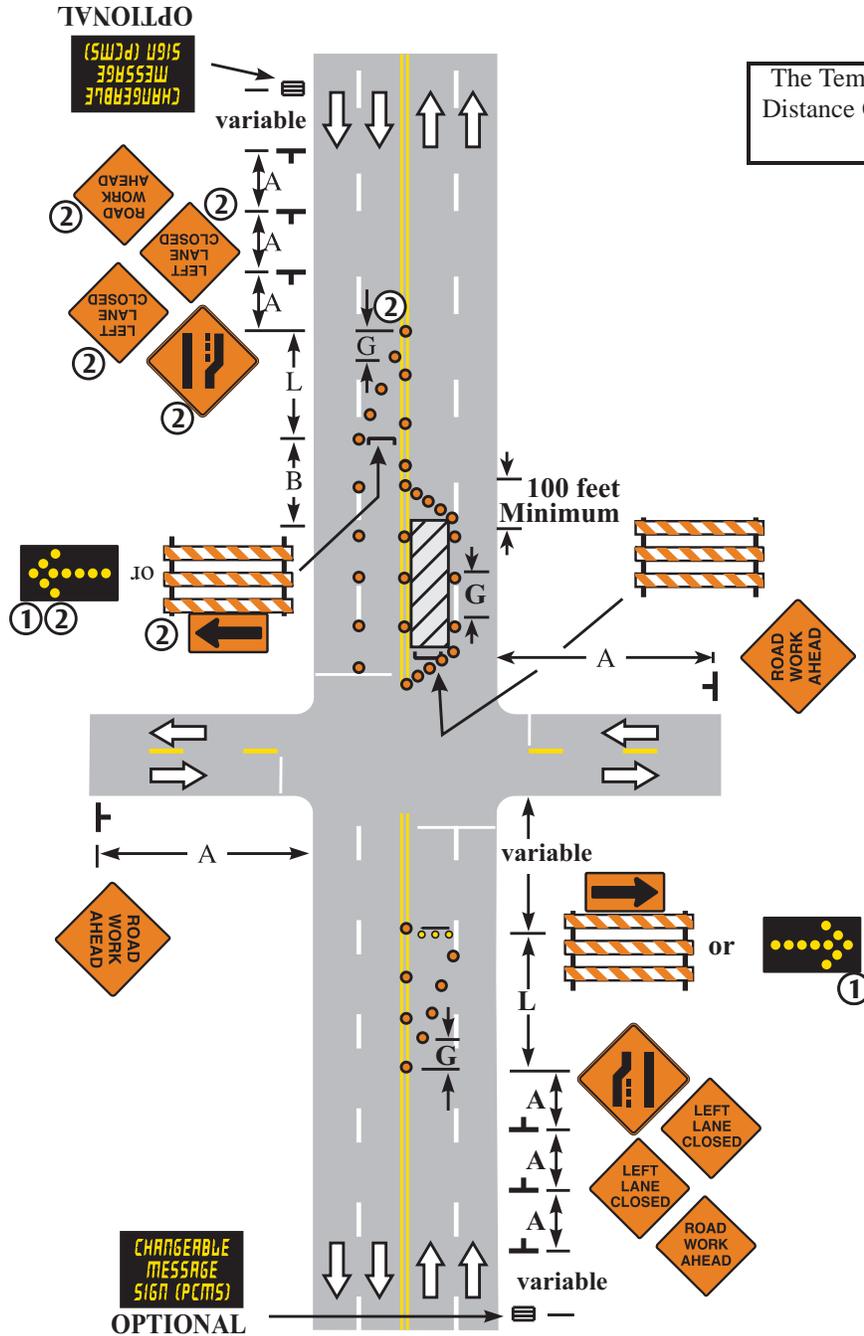
**LEFT LANE CLOSURE  
MULTI-LANE UNDIVIDED ROAD**

3 DAYS or LESS

LAYOUT 35

NOTES:

1. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
2. The lane closure may be omitted when the posted speed limit is 40 mph or less, or when the workers are not at the work site.



The Temporary Traffic Control Distance Charts can be found on page 6K-125

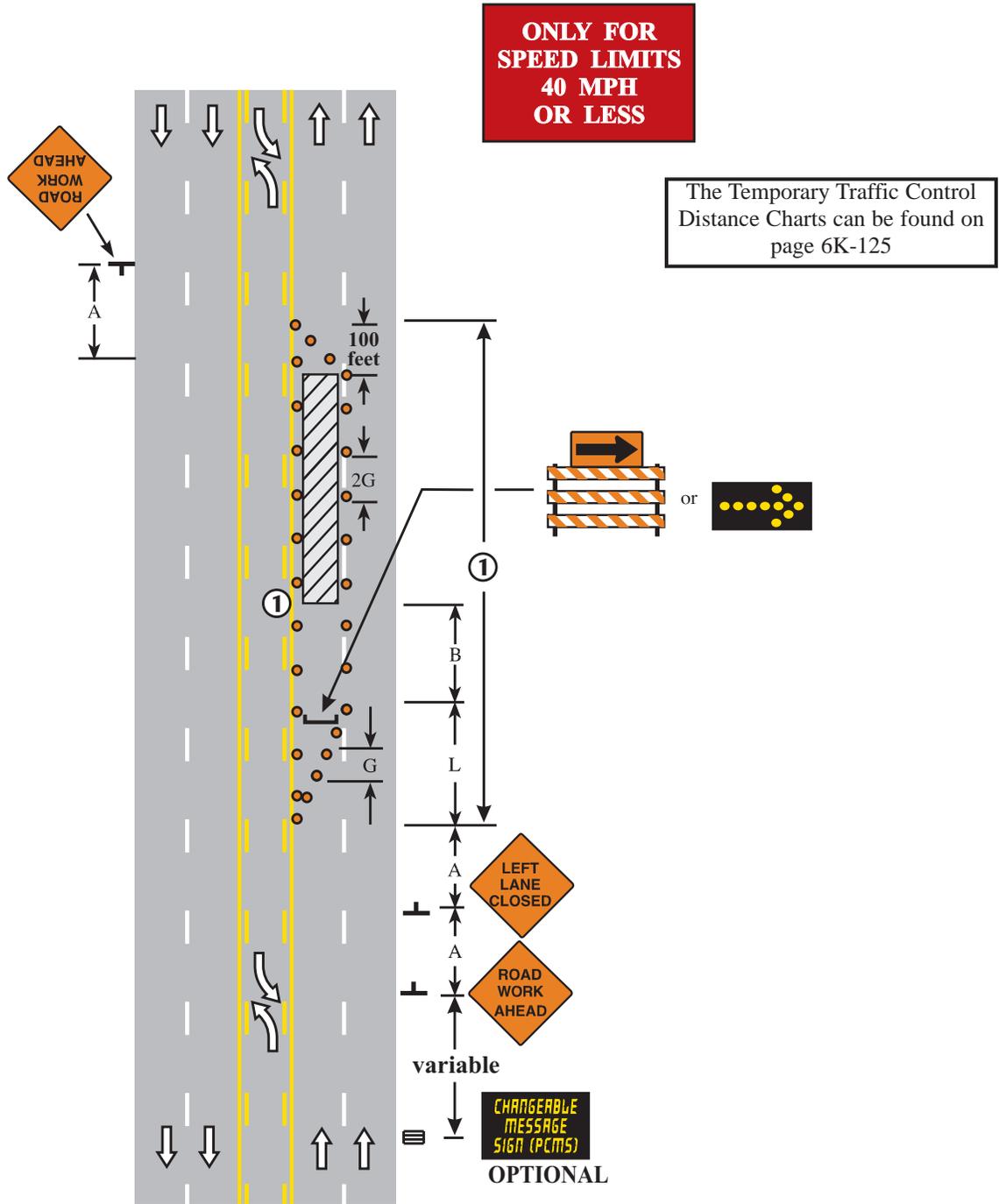
**LEFT LANE CLOSURE  
WORK SPACE AT INTERSECTION  
MULTI-LANE UNDIVIDED ROAD**

3 DAYS or LESS

LAYOUT 36

NOTES:

1. Parking, stopping and left turning vehicles may be prohibited along the work space and taper.



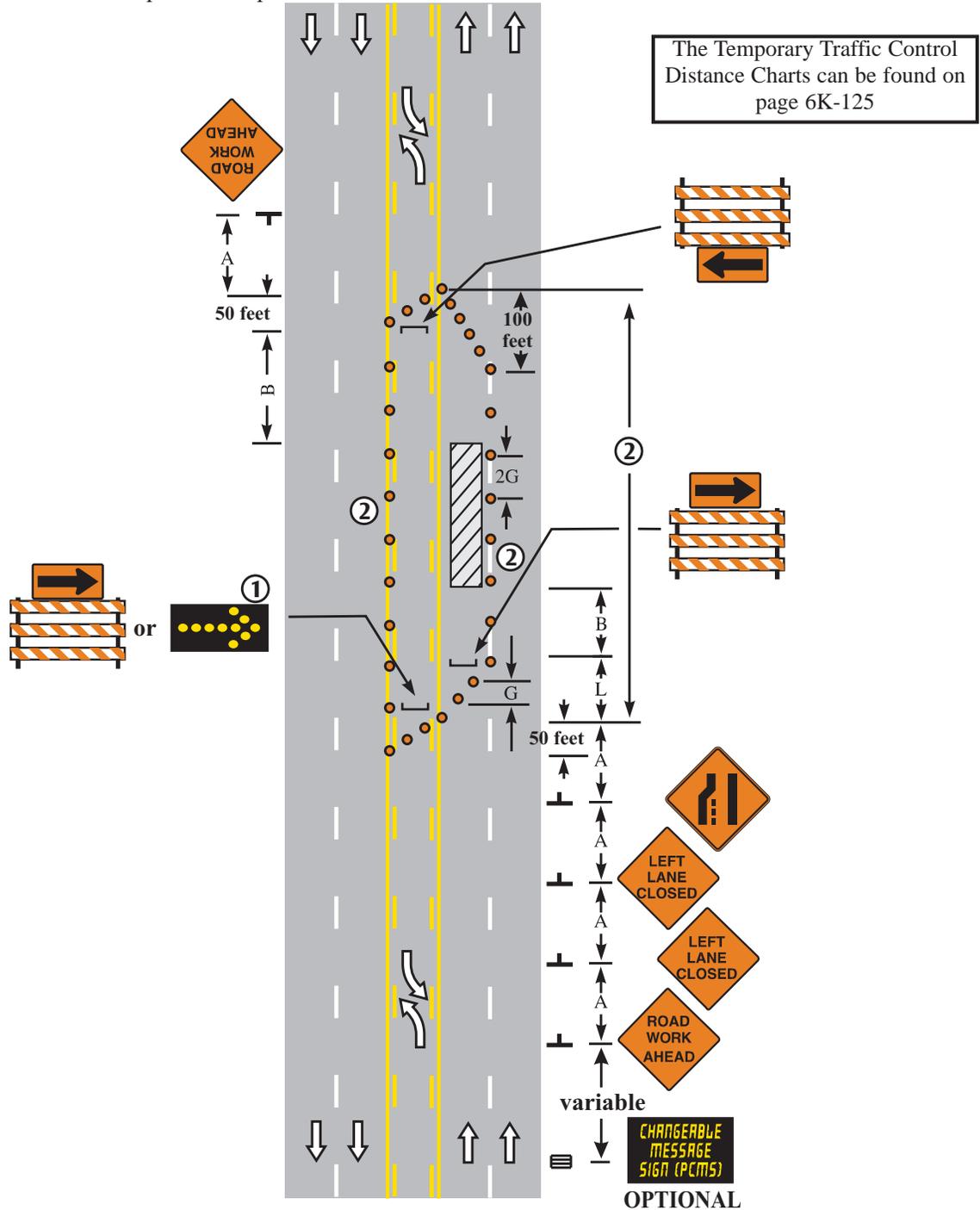
**LEFT LANE CLOSURE  
MULTI-LANE UNDIVIDED ROAD  
WITH TWO-LANE TWO-WAY LEFT TURN LANE**

3 DAYS or LESS

LAYOUT 37

NOTES:

1. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
2. Parking, stopping and left turning vehicles may be prohibited along the work space and taper.



**LEFT LANE CLOSURE  
MULTI-LANE UNDIVIDED ROAD  
WITH TWO-LANE TWO-WAY LEFT TURN LANE**

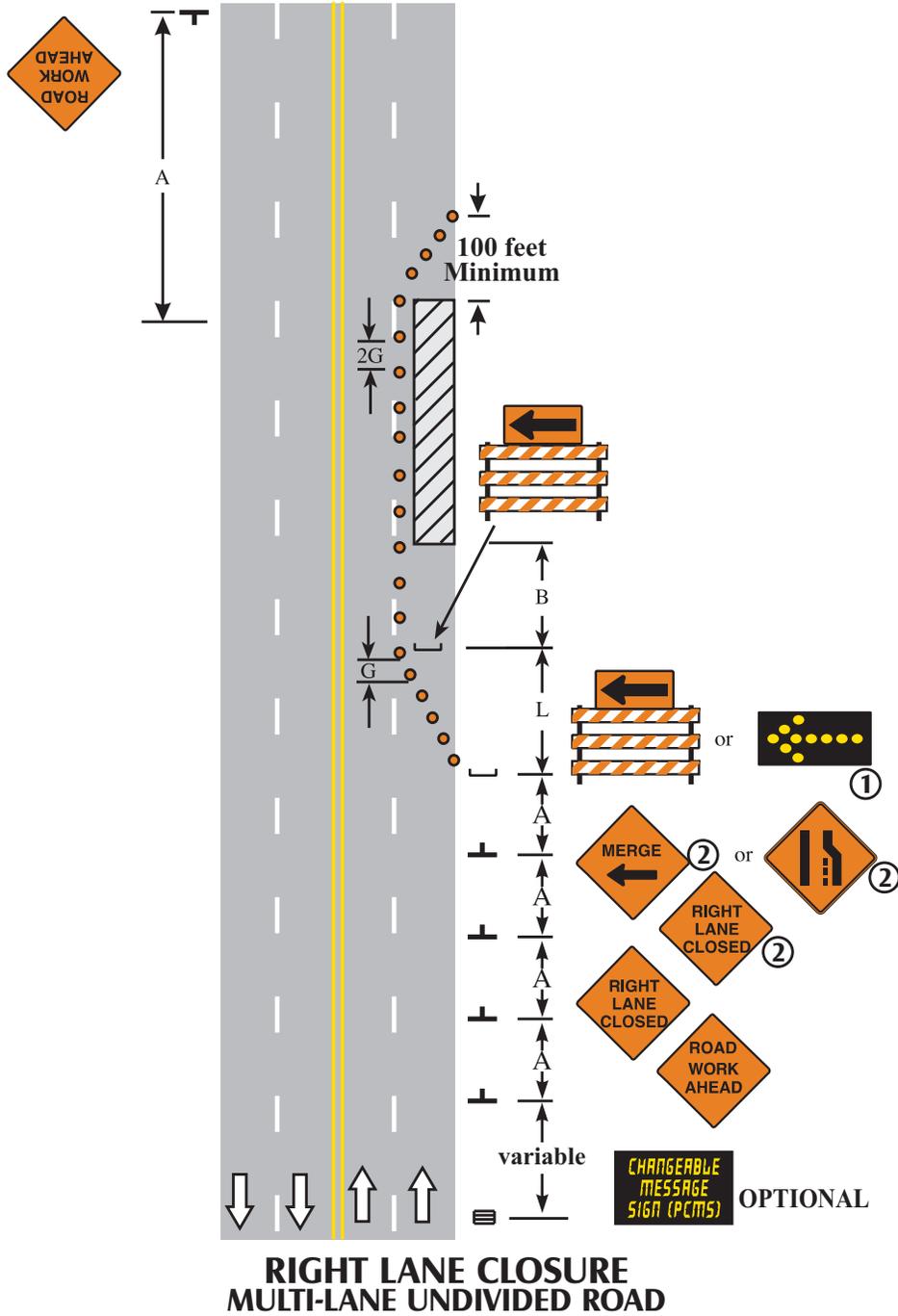
3 DAYS or LESS

LAYOUT 38

NOTES:

1. The flashing arrow board shall be used where the posted speed limit is 45 mph or greater.
2. The RIGHT LANE CLOSED sign and the MERGE with arrow sign or Lane Drop sign, may be omitted when the posted speed limit is 40 mph or less.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



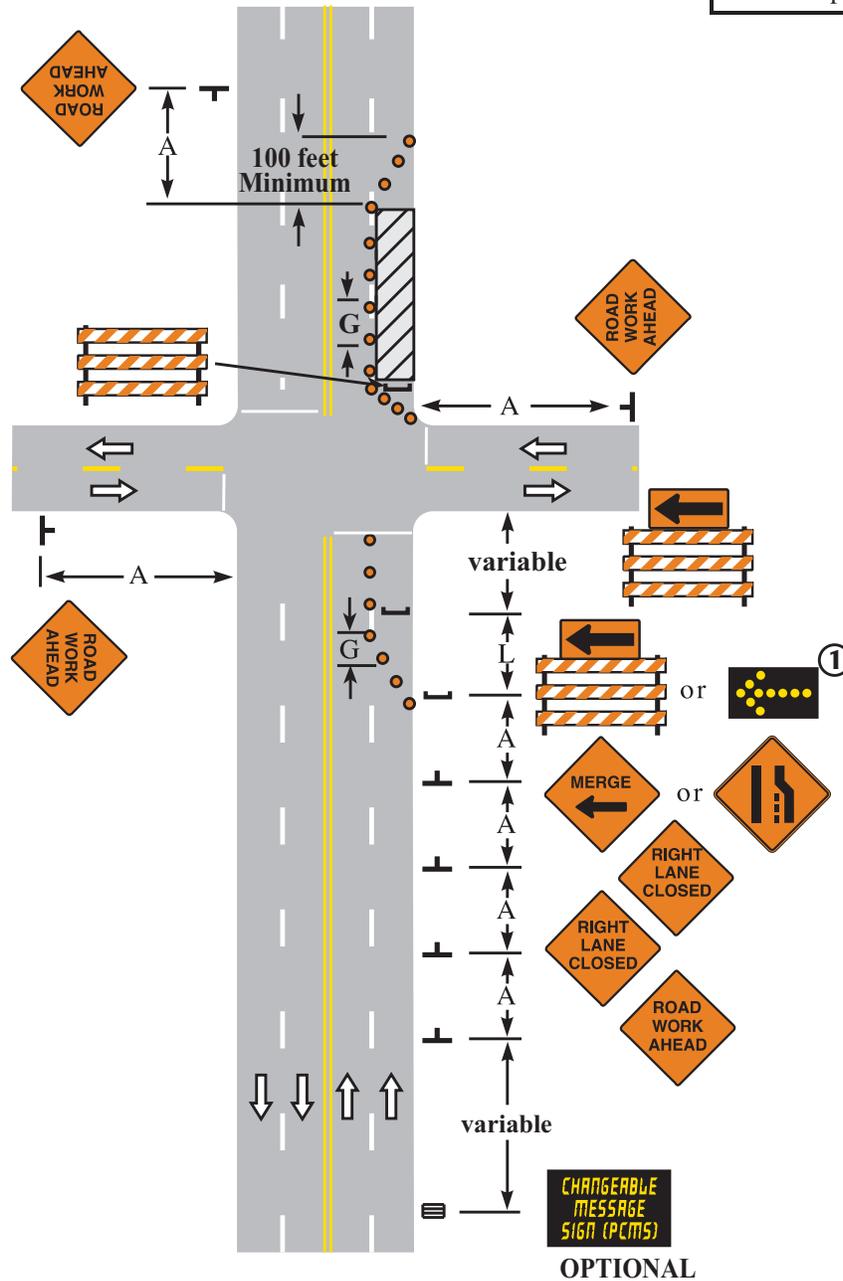
3 DAYS or LESS

LAYOUT 39

NOTES:

1. The flashing arrow board shall be used when the posted speed limit is 45mph or greater.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



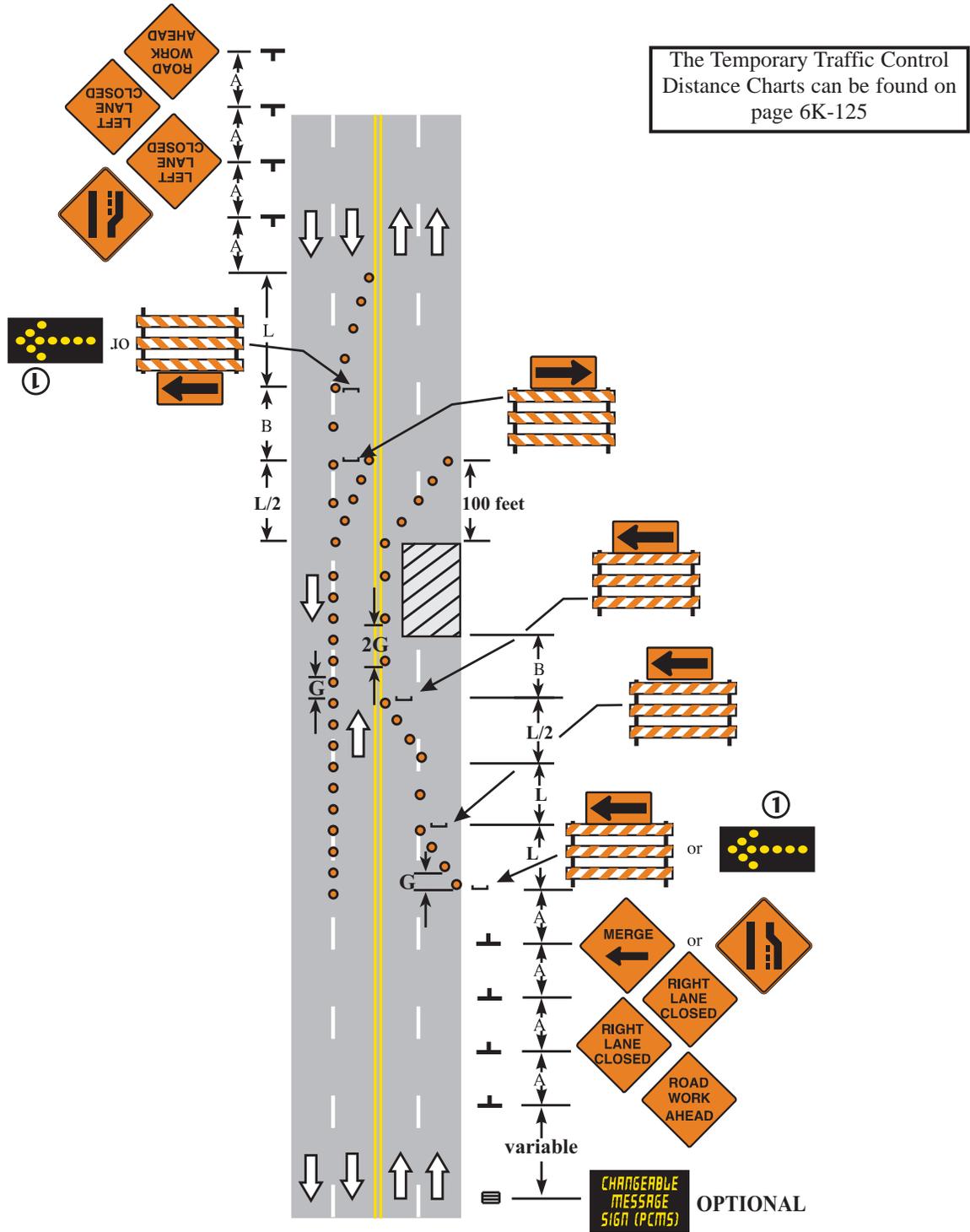
**RIGHT LANE CLOSURE  
WORK SPACE AT INTERSECTION  
MULTI-LANE UNDIVIDED ROAD**

3 DAYS or LESS

LAYOUT 40

NOTES:

1. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.



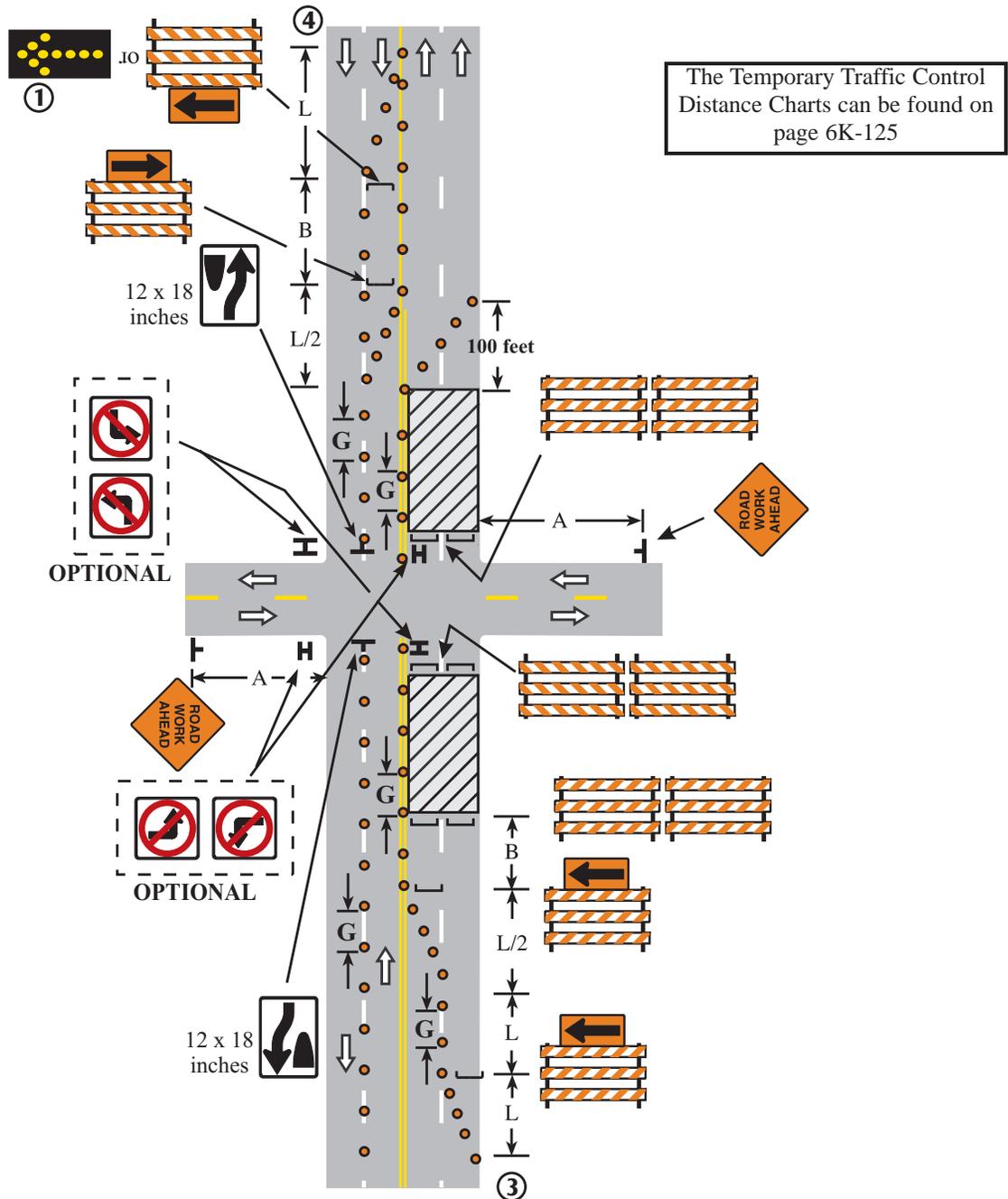
**DOUBLE LANE CLOSURE  
MULTI-LANE UNDIVIDED ROAD**

3 DAYS or LESS

LAYOUT 41

NOTES:

1. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
2. Contact the appropriate road authority for the placement of temporary STOP signs or signal timing modifications before beginning work at any signalized intersection.
3. For the placement of advance warning signs, see Layout 41.
4. For the placement of advance warning signs, see Layout 34 or 35.



**DOUBLE LANE CLOSURE AT INTERSECTION  
MULTI-LANE UNDIVIDED ROAD**

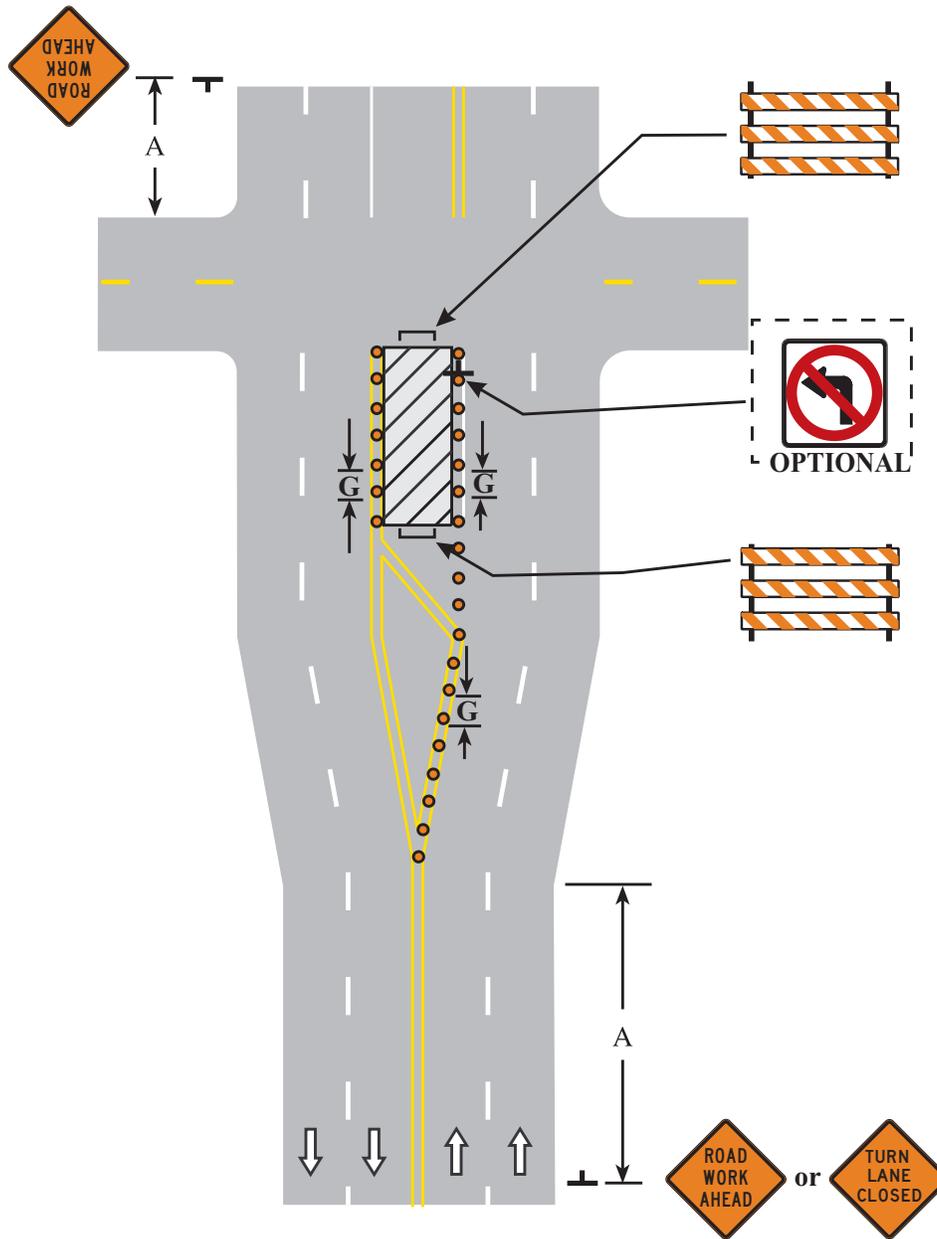
3 DAYS or LESS

LAYOUT 42

NOTES:

1. Contact the appropriate road authority for signal timing modifications before beginning work at any signalized intersection.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



### LEFT TURN LANE CLOSURE

3 DAYS or LESS

LAYOUT 43

**This page has been intentionally left blank.**

**There is no Layout 44.**

Multi-Lane  
Divided

# Multi-Lane Divided

Two separate roadways where opposing traffic is separated by a median.



## MULTI-LANE DIVIDED ROADS

	MOBILE	SHORT DURATION	SHORT TERM	INTERMEDIATE TERM
	15 Minutes or Less	One Hour or Less	12 Hours or Less	3 Days or Less
Work on Shoulder	1		2, 4	
Work off Shoulder	2			
Parking Lane Closure	3			
Lane Closures				
Mobile/Short Duration	45, 46	50		
Nighttime	51			
Center Lane	52			
Left/Right Lane	53, 54, 55, 56			
Left/Right Lane	33*			
Turn Lane	27			
Double Lane	57, 58			
Extended Lane	59			
Lane Shift	60			
Near Ramp	61, 62, 63			
Partial Ramp Closure	64			
Ramp Closure	47, 48, 49	65, 66		
Work near Intersection	32	27, 54, 55		
Road Closure	83			
Sidewalk Closure	84, 85			

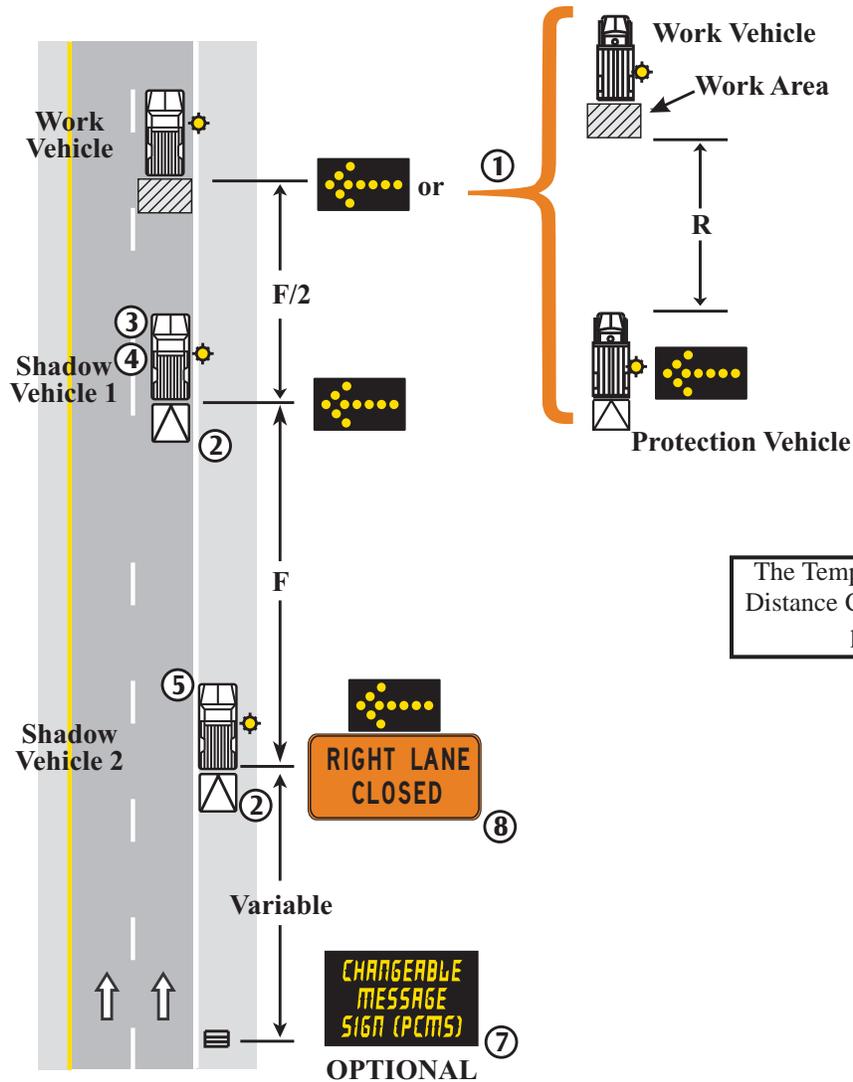
\* **NOTE:** Low Speed, Intermediate Volume Roads Only.

These Layouts as well as the entire Field Manual, the Flagging Handbook and other documents are available on the Mn/DOT, Traffic Engineering website at:

<http://www.dot.state.mn.us/trafficeng/>

**NOTES:**

1. A work vehicle without a flashing arrow board shall be followed by a protection vehicle at a distance of **R**. The protecting vehicle shall be equipped with a flashing arrow board and should have a truck mounted attenuator.
2. All shadow vehicles operating totally or partially in a traffic lane should be equipped with a truck mounted attenuator.
3. The lateral placement of shadow vehicle 1 may be adjusted to create a taper when a Protection Vehicle is used.
4. Shadow Vehicle 1 may be omitted on non-freeway design roadways.
5. Shadow Vehicle 2 may encroach into the traffic lane when the shoulder is too narrow to drive on.
6. If the operation does not move at least the Decision Sight Distance (**D**) every 15 minutes, Layout 50 or the appropriate stationary layout should be used.
7. The PCMS shall be used for nighttime operations.
8. When the PCMS is used, the RIGHT LANE CLOSED sign becomes optional.



**MOBILE LANE CLOSURE  
MULTI-LANE ROAD**

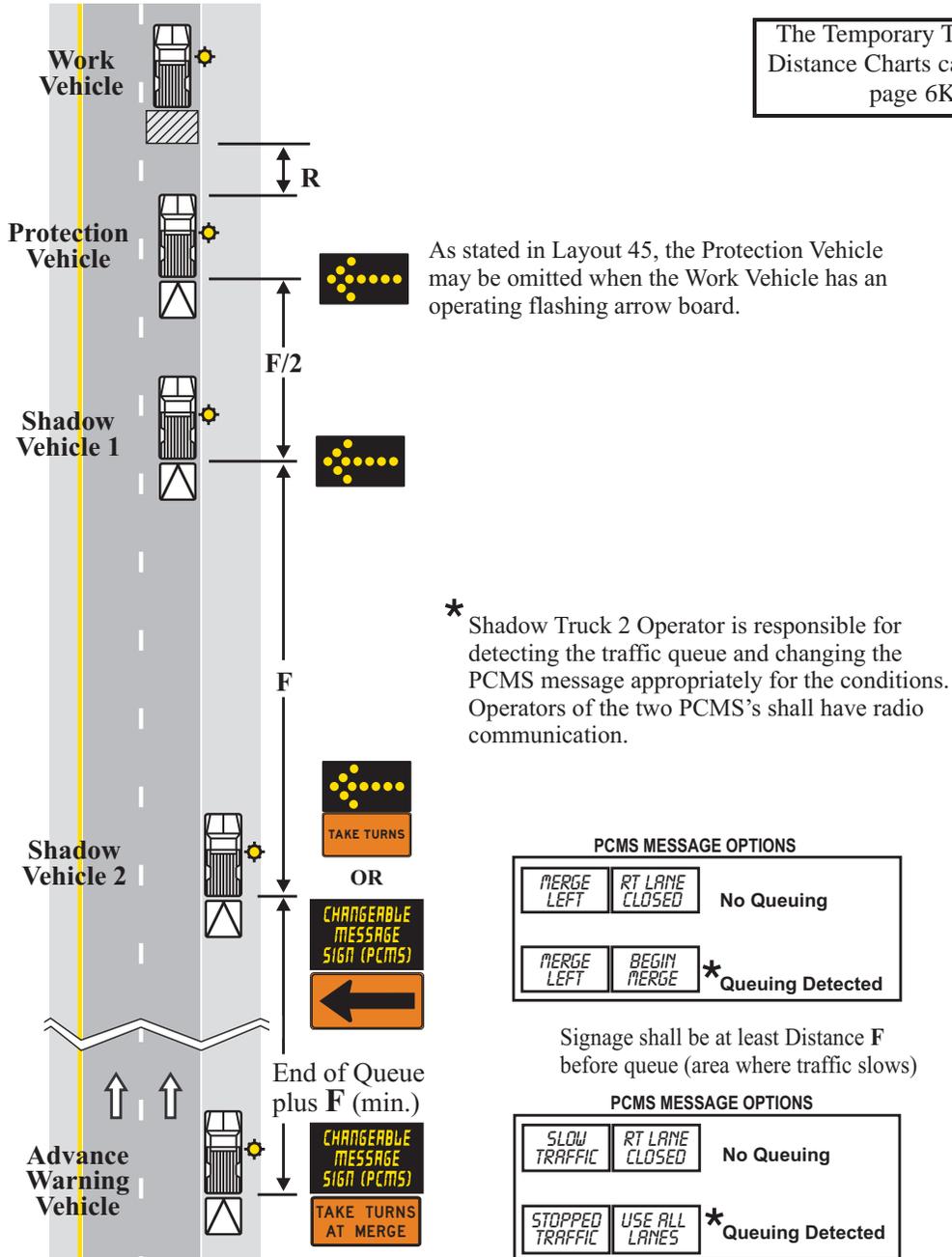
15 MINUTES or LESS

LAYOUT 45

**NOTES:**

1. All shadow vehicles operating totally or partially in a traffic lane should be equipped with a truck mounted attenuator.
2. The lateral placement of shadow vehicle 1 may be adjusted to create a taper when a Protection Vehicle is used.
3. Shadow Vehicle 1 may be omitted on non-freeway design roadways.
4. Shadow Vehicle 2 may encroach into the traffic lane when the shoulder is too narrow to drive on.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



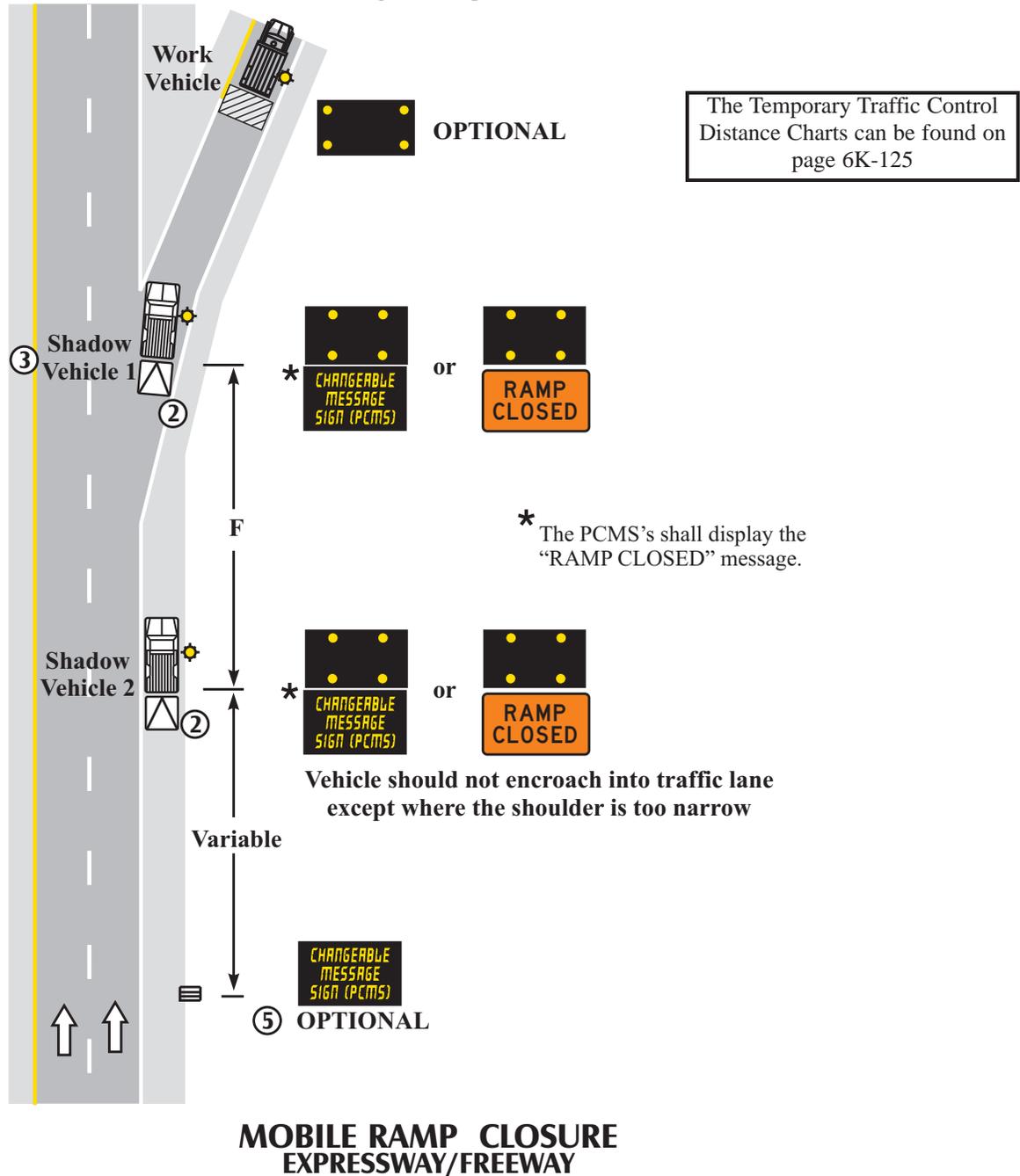
**MOBILE LANE CLOSURE WITH LATE MERGE MULTI-LANE ROAD**

15 MINUTES or LESS

LAYOUT 46

**NOTES:**

1. The protection vehicle should remain positioned near the ramp gore to prevent traffic from using the exit ramp. If a protection vehicle follows the work vehicle up the ramp, then it shall remain a minimum distance **R** from the work area.
2. Any shadow or protection vehicle operating totally or partially in a traffic lane should be equipped with a truck mounted attenuator.
3. The vehicles blocking the exit ramp should not encroach into lanes open to traffic.
4. If the ramp can not be reopened within 15 minutes, the appropriate stationary layout should be used.
5. The PCMS shall be used for nighttime operations.

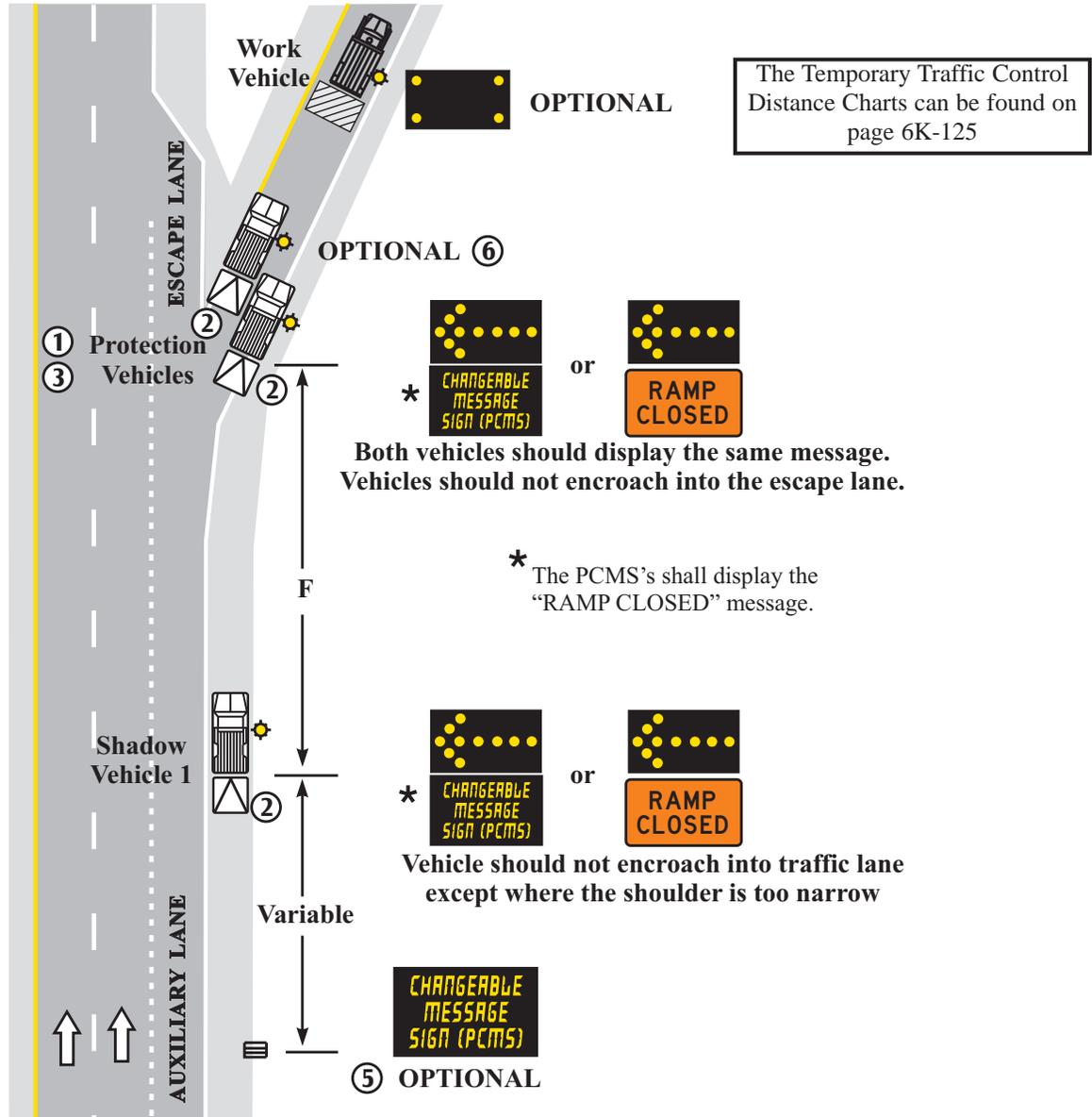


15 MINUTES or LESS

LAYOUT 47

**NOTES:**

1. The protection vehicle should remain positioned near the ramp gore to prevent traffic from using the exit ramp. If the operation requires one protection vehicle to follow the work vehicle up the ramp, then it shall remain a minimum distance **R** from the work area.
2. Any shadow or protection vehicle operating totally or partially in a traffic lane should be equipped with a truck mounted attenuator.
3. The vehicles blocking the exit ramp should not encroach into lanes open to traffic and should allow traffic to use the escape lane.
4. If the ramp can not be reopened within 15 minutes, the appropriate stationary layout should be used.
5. The PCMS's shall be used for nighttime operations.
6. The optional second protection vehicle may be needed to block wider exit ramps.



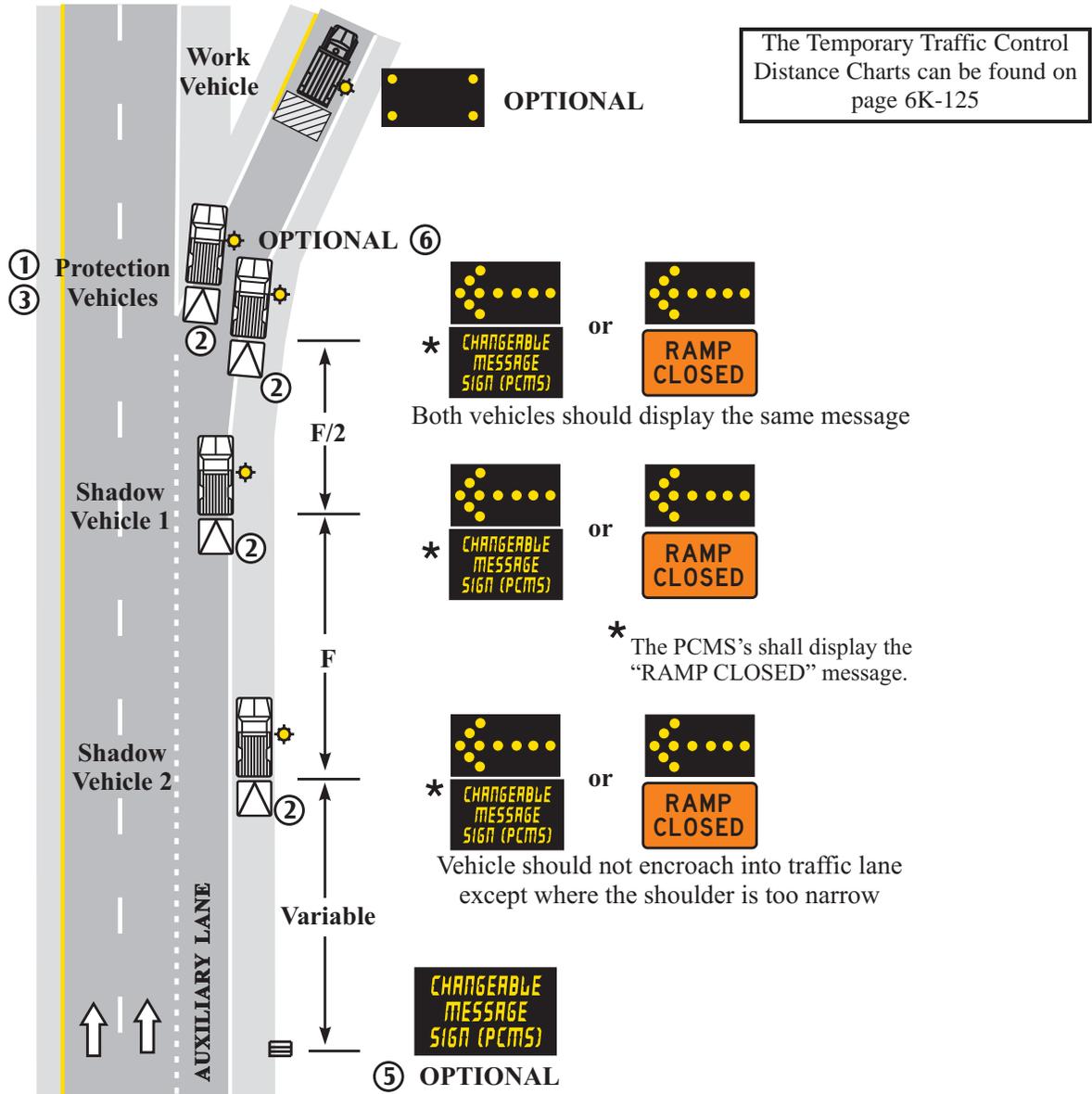
**MOBILE RAMP CLOSURE with ESCAPE LANE  
EXPRESSWAY/FREEWAY**

15 MINUTES or LESS

LAYOUT 48

**NOTES:**

1. The protection vehicle should remain positioned near the ramp gore to prevent traffic from using the exit ramp. If a protection vehicle follows the work vehicle up the ramp, then the flashing arrow display shall change to the caution mode shall remain a minimum distance **R** from the work area.
2. Any shadow or protection vehicle operating totally or partially in a traffic lane should be equipped with a truck mounted attenuator.
3. The vehicles blocking the exit ramp should not encroach into lanes open to traffic.
4. If the ramp can not be reopened within 15 minutes, the appropriate stationary layout should be used.
5. The PCMS shall be used for nighttime operations.
6. The optional second protection vehicle may be needed to block wider exit ramps.



**MOBILE RAMP CLOSURE with LANE DROP  
EXPRESSWAY/FREEWAY**

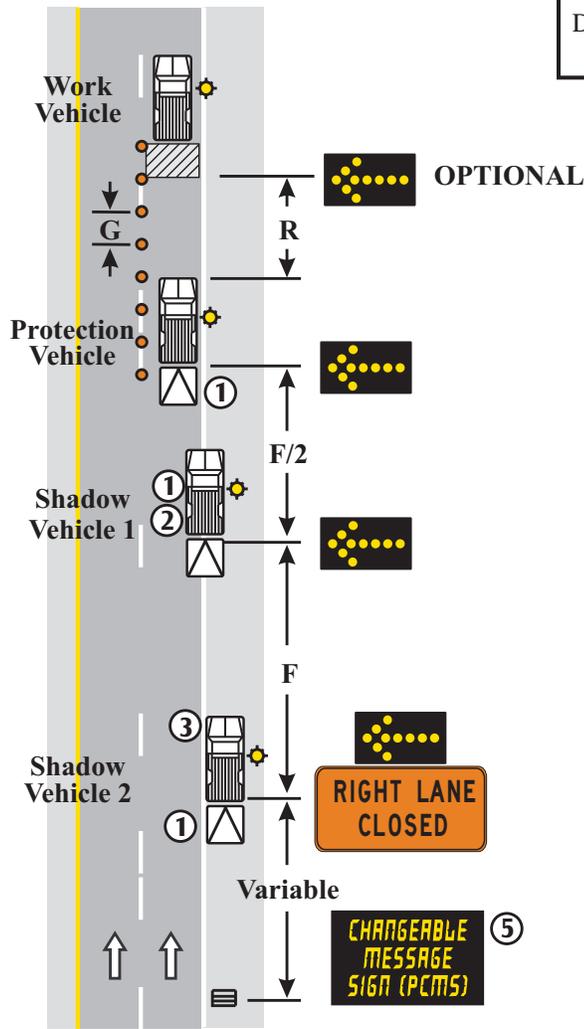
15 MINUTES or LESS

LAYOUT 49

**NOTES:**

1. All Shadow and Protection Vehicles shall be equipped with a truck-mounted attenuator.
2. The lateral placement of Shadow Vehicle 1 may be adjusted to create a taper.
3. Shadow Vehicle 2 may encroach into the traffic lane when the shoulder is too narrow to drive on.
4. If the operation does not move at least the Decision Sight Distance once each hour, the appropriate stationary layout should be used.
5. A typical message should be ROAD WORK AHEAD and RIGHT LANE CLOSED.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



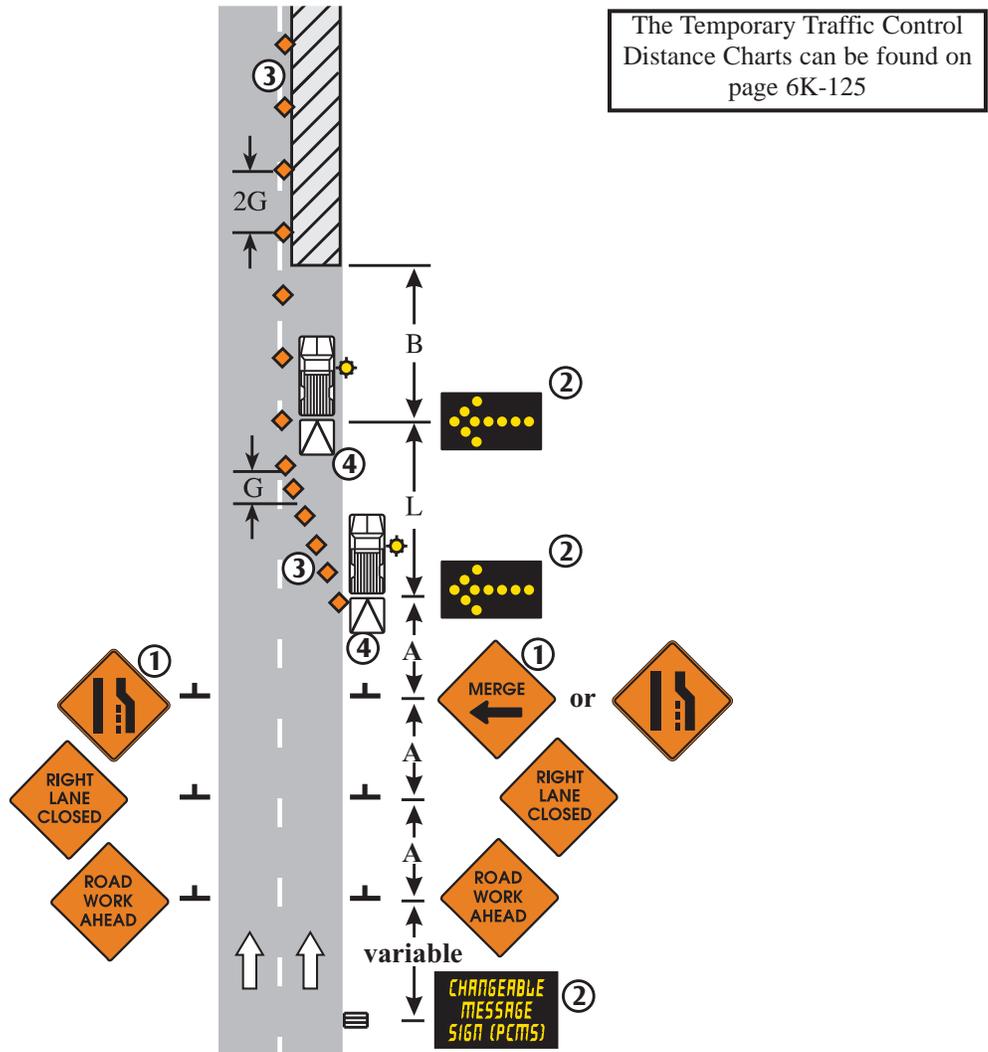
**SHORT DURATION LANE CLOSURE  
MULTI-LANE ROAD**

1 HOUR or LESS

LAYOUT 50

NOTES:

1. The Lane Reduction sign and the MERGE sign may be omitted when the posted speed limit is 40 mph or less.
2. In order to use this layout, two flashing arrow boards, at least one PCMS, and advance warning signs shall be used. If these devices are not available, either Layout 52 shall be used.
3. When using a combination of cones (28 inch minimum height) and Direction Indicator Barricades every third device in the merge taper and every tenth device in the tangent area shall be a Directional Indicator Barricade.
4. All shadow vehicles operating totally or partially in a traffic lane should be equipped with a truck mounted attenuator.



**LANE CLOSURE  
OCCUPIED NIGHTTIME WORK SPACE  
MULTI-LANE DIVIDED ROAD**

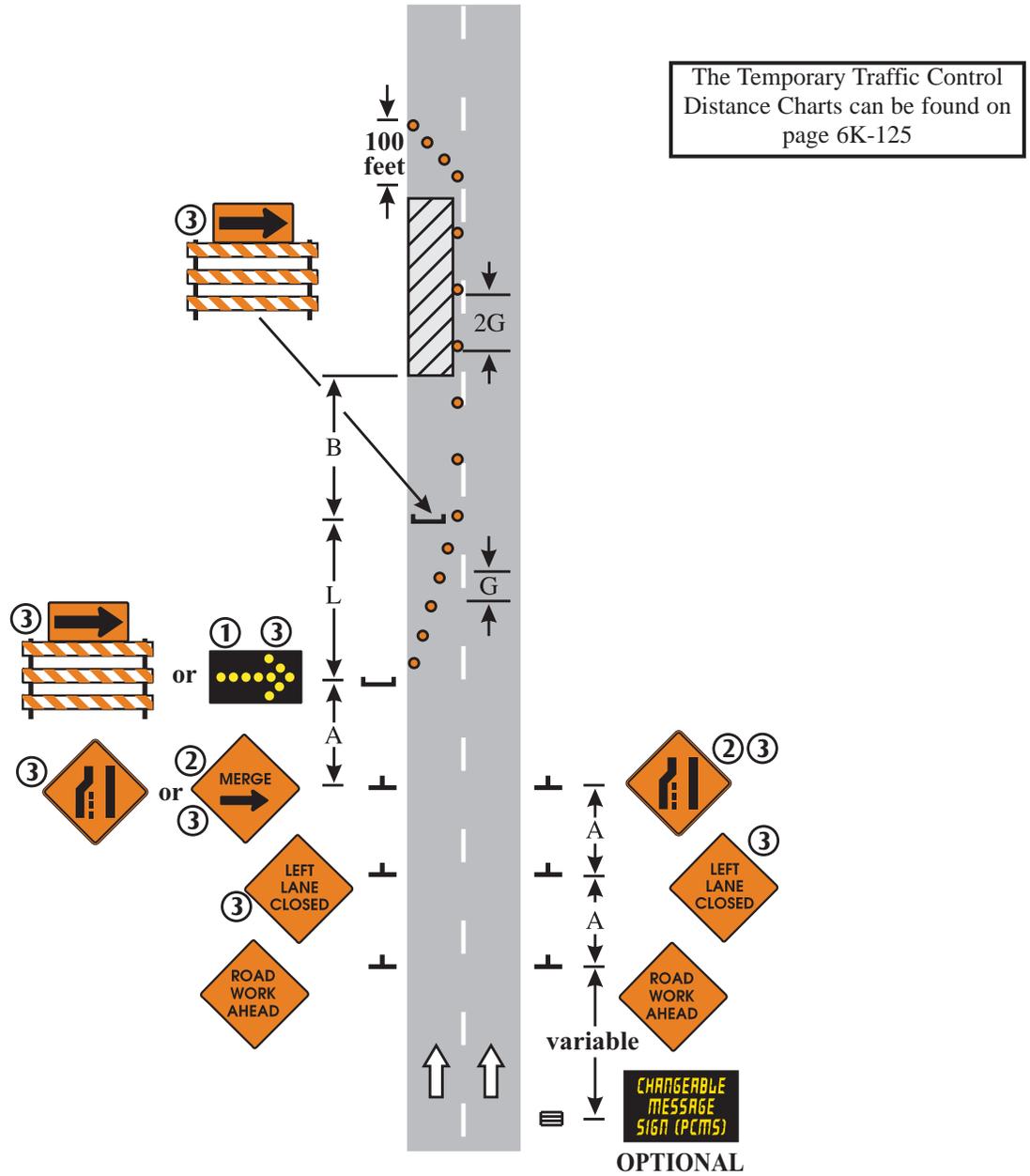
12 HOURS or LESS

LAYOUT 51



NOTES:

1. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
2. The Lane Drop symbol sign and the Merge with arrow sign may be omitted when the posted speed limit is 40 mph or less.
3. Use the appropriate traffic control devices for a right lane closure.



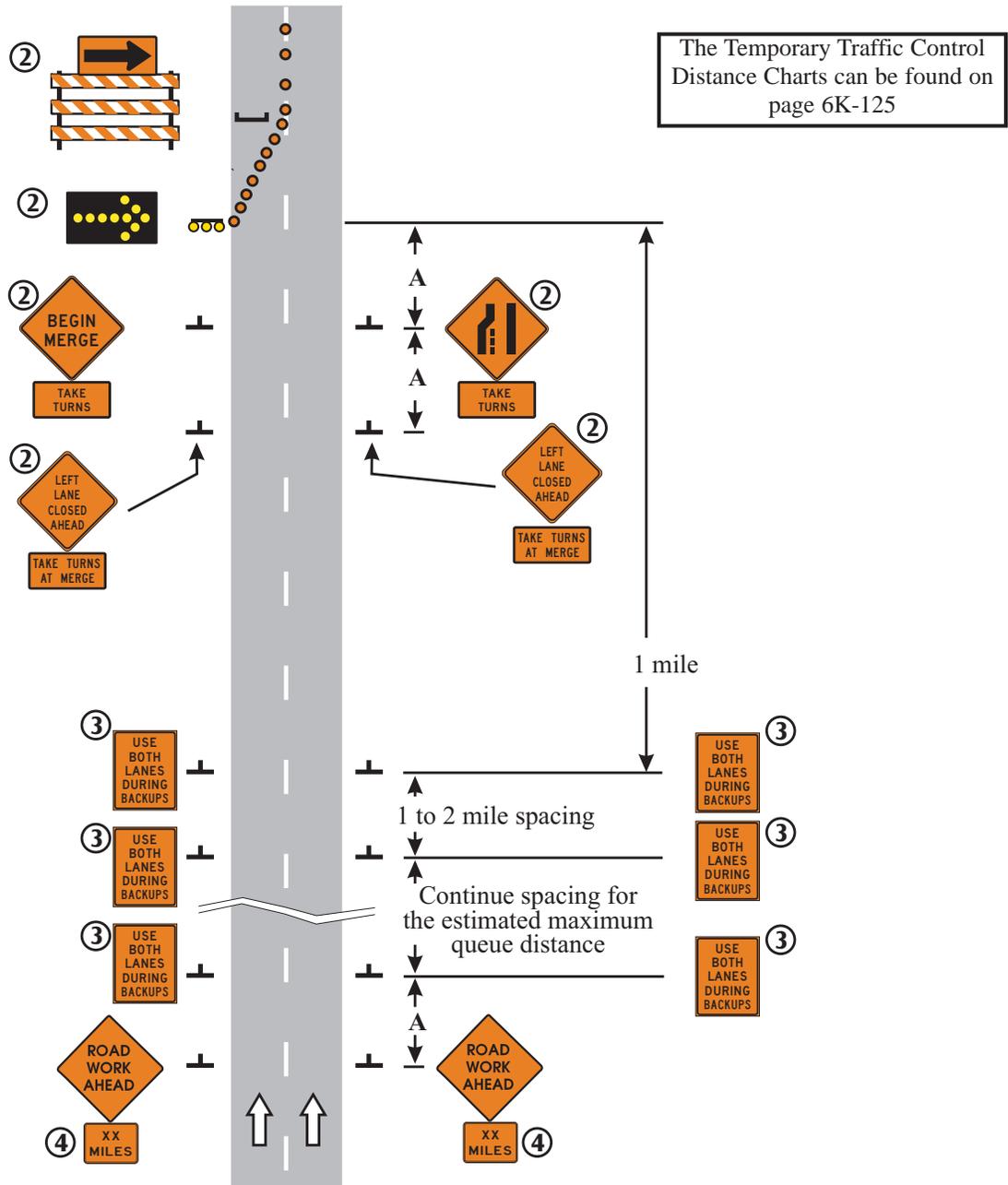
**LANE CLOSURE  
MULTI-LANE DIVIDED ROAD**

3 DAYS or LESS

LAYOUT 53

NOTES:

1. This layout should be used on high speed roadways where traffic queues may extend at least 0.5 mile upstream of the taper. If little or no queuing is anticipated, use the typical lane closure Layout 52.
2. Use the appropriate traffic control devices for a left lane closure.
3. A PCMS may be used in place of a pair of USE BOTH LANES DURING BACKUPS signs.
4. Distance plaques are recommended when the distance is 2 miles or more.



**LANE CLOSURE WITH LATE MERGE  
MULTI-LANE DIVIDED ROAD**

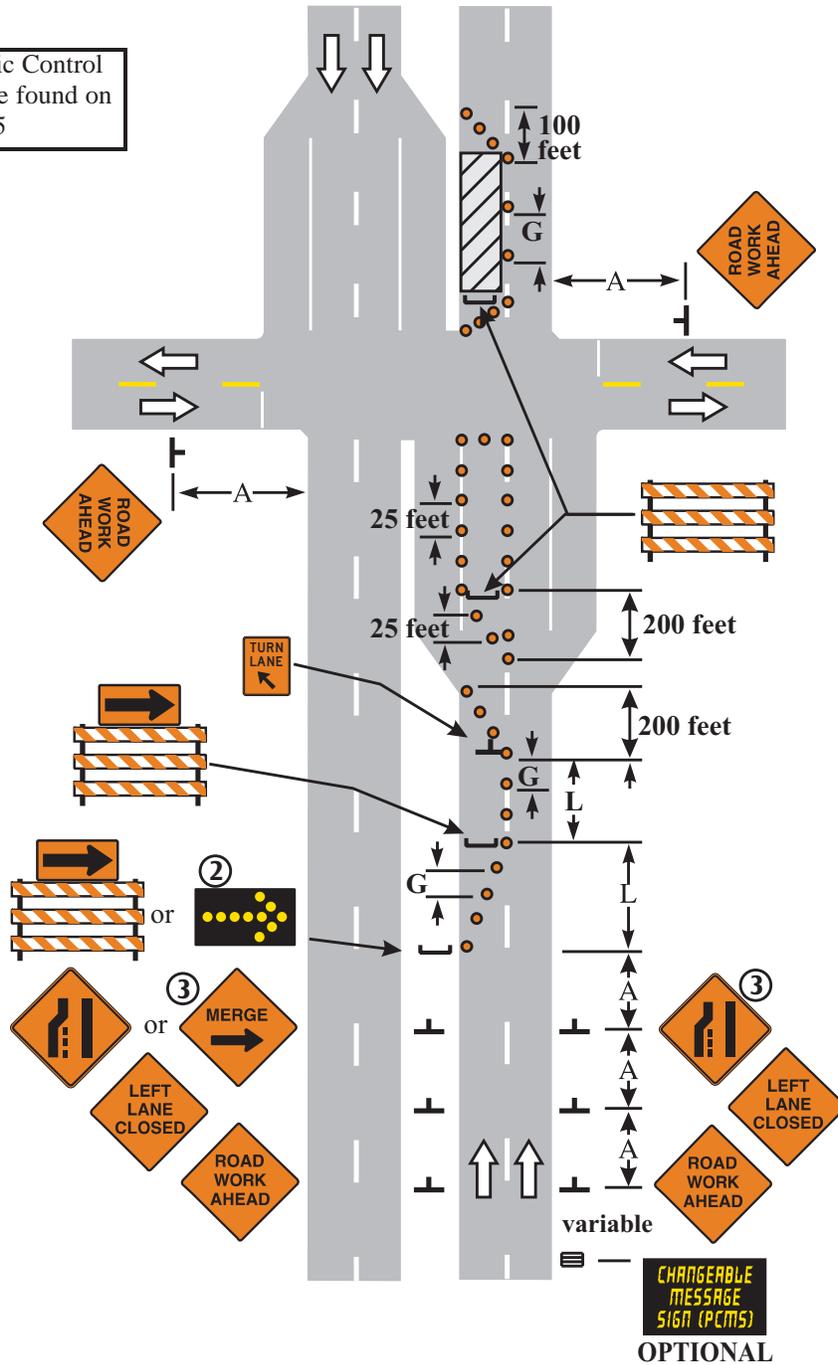
3 DAYS or LESS

LAYOUT 54

NOTES:

1. Use the appropriate advance warning sign spacing for the speed on the cross road.
2. The flashing arrow board shall be used when the posted speed limit is 45 or greater.
3. The Lane Drop symbol sign and the MERGE with Arrow sign may be omitted when the posted speed limit is 40 mph or less.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**LEFT LANE CLOSURE  
WORK SPACE BEYOND INTERSECTION  
MULTI-LANE DIVIDED ROAD**

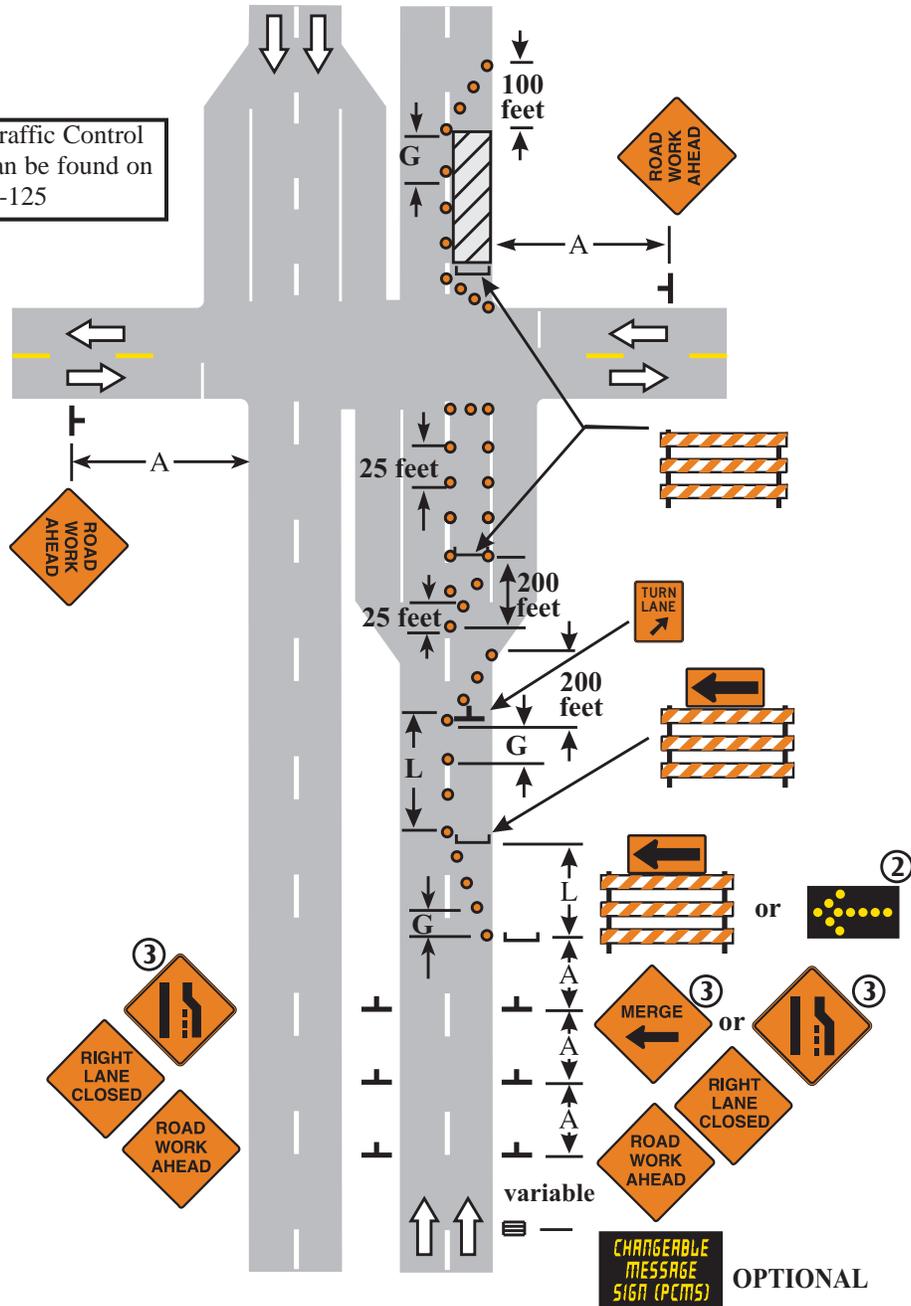
3 DAYS or LESS

LAYOUT 55

NOTES:

1. Use the appropriate advance warning sign spacing for the speed on the cross road.
2. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
3. The Lane Drop symbol sign and the MERGE with Arrow sign may be omitted when the posted speed limit is 40 mph or less.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



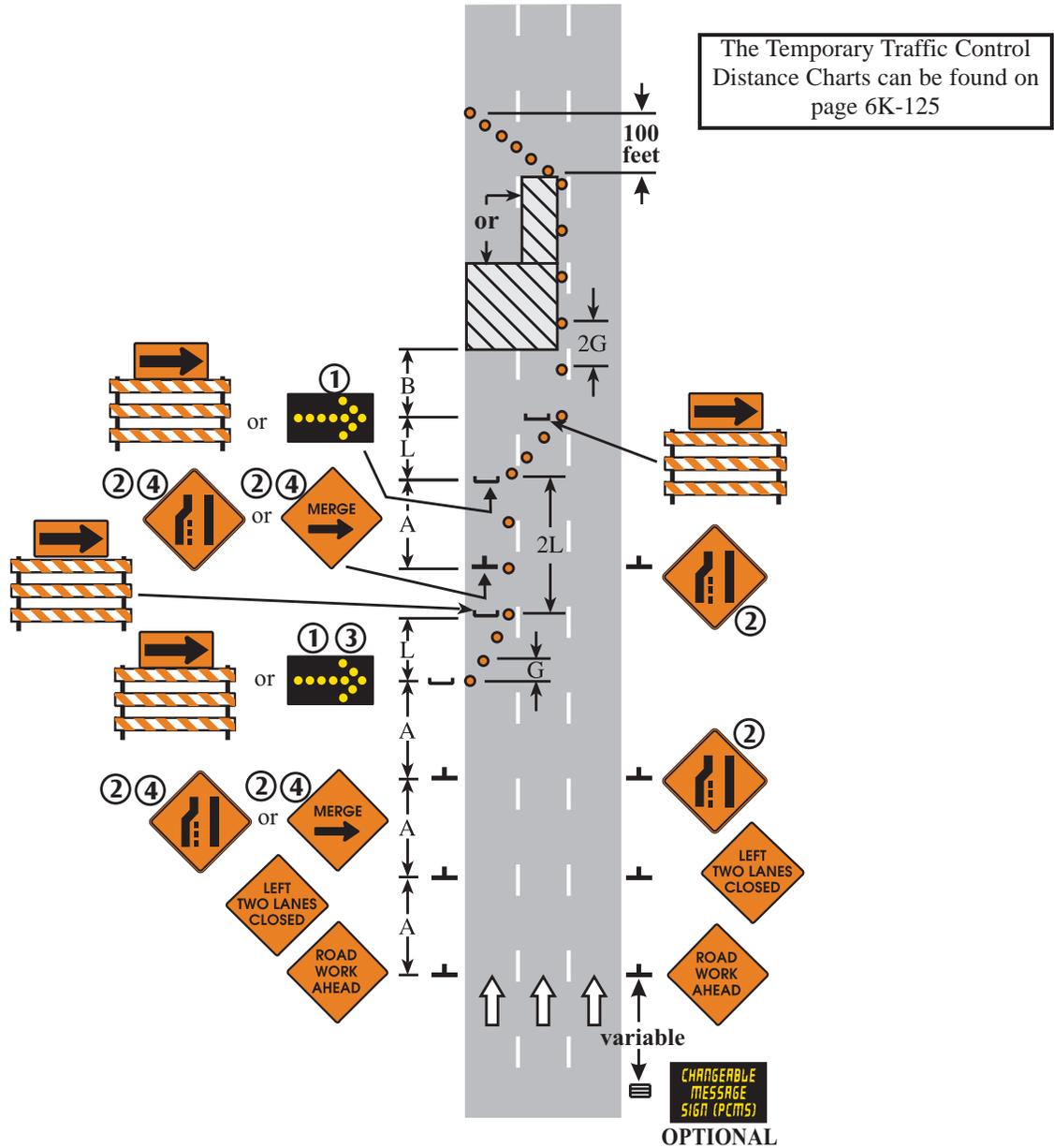
**RIGHT LANE CLOSURE  
WORK SPACE BEYOND INTERSECTION  
MULTI-LANE DIVIDED ROAD**

3 DAYS or LESS

LAYOUT 56

NOTES:

1. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
2. The Lane Drop symbol signs, the Merge with arrow signs, and the arrow board may be omitted when the posted speed limit is 40 mph or less.
3. If the flashing arrow board will not fit entirely on the left shoulder, it should be placed behind the taper, encroaching on the lane as little as possible.
4. When the Lane Drop symbol sign or the MERGE with arrow sign is used, the same sign shall be used for both lane closures in each direction.



**LEFT TWO LANES CLOSED  
MULTI-LANE DIVIDED ROAD**

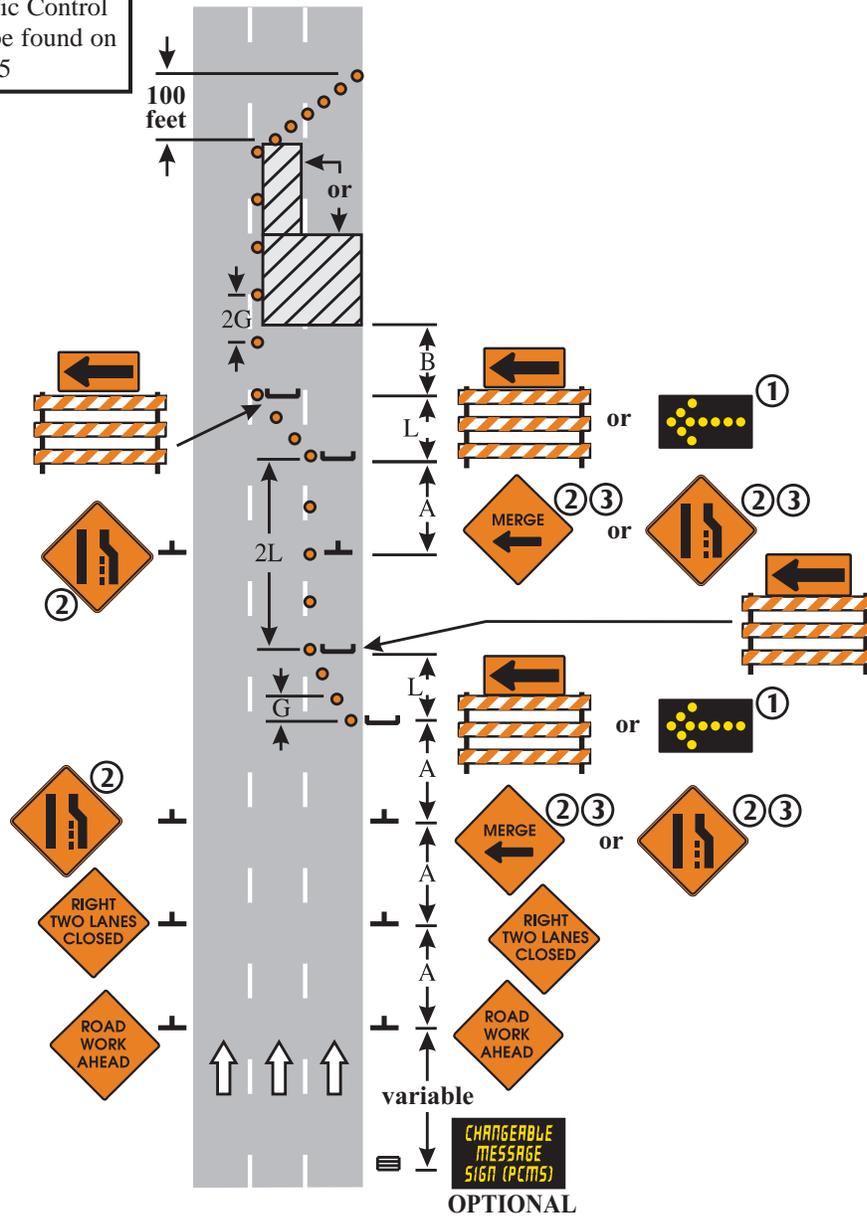
3DAYS or LESS

LAYOUT 57

NOTES:

1. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
2. The Lane Drop symbol sign and the Merge with arrow sign may be omitted when the posted speed limit is 40 mph or less.
3. When the Lane Drop symbol sign or the MERGE with arrow sign is used, the same sign shall be used for both lane closures in each direction.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**RIGHT TWO LANES CLOSED  
MULTI-LANE DIVIDED ROAD**

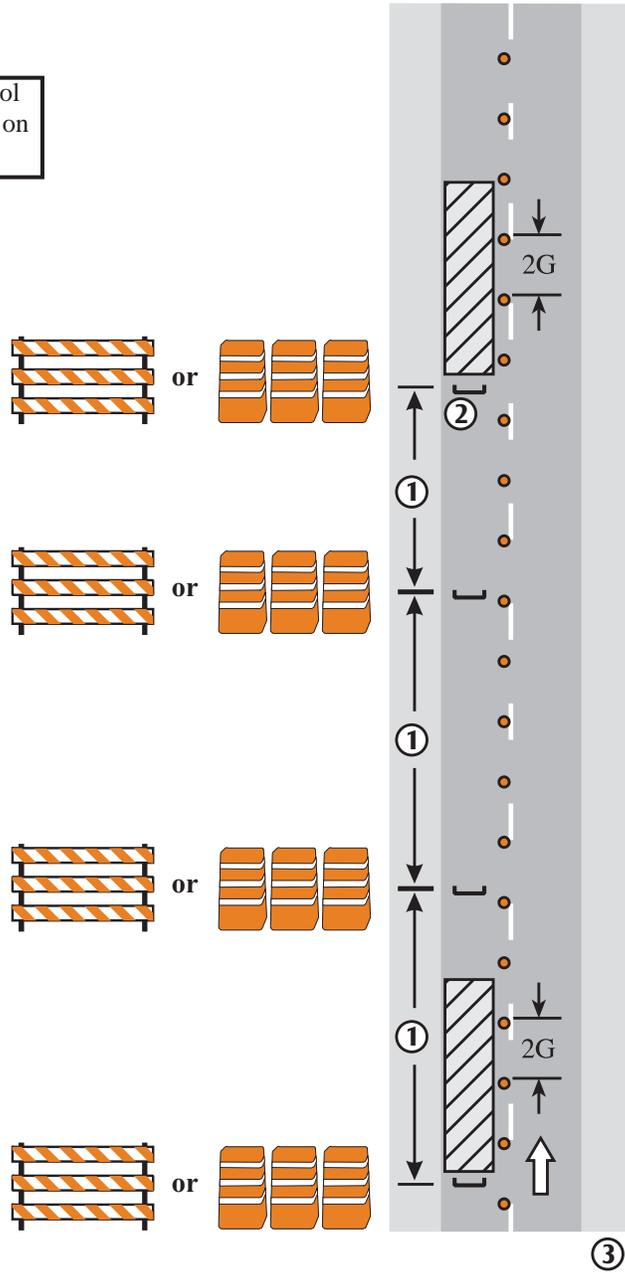
3 DAYS or LESS

LAYOUT 58

NOTES:

1. Install a Type III barricade at the beginning of each work space and at intervals from 500 feet minimum to 1000 feet maximum within the closed lane.
2. The Type III barricade within the work space may be omitted when the work space is occupied.
3. For advance signing, placement of traffic control devices, and lane taper, see the appropriate stationary layout.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**LANE CLOSURE EXTENSION  
MULTI-LANE DIVIDED OR ONE WAY ROAD**

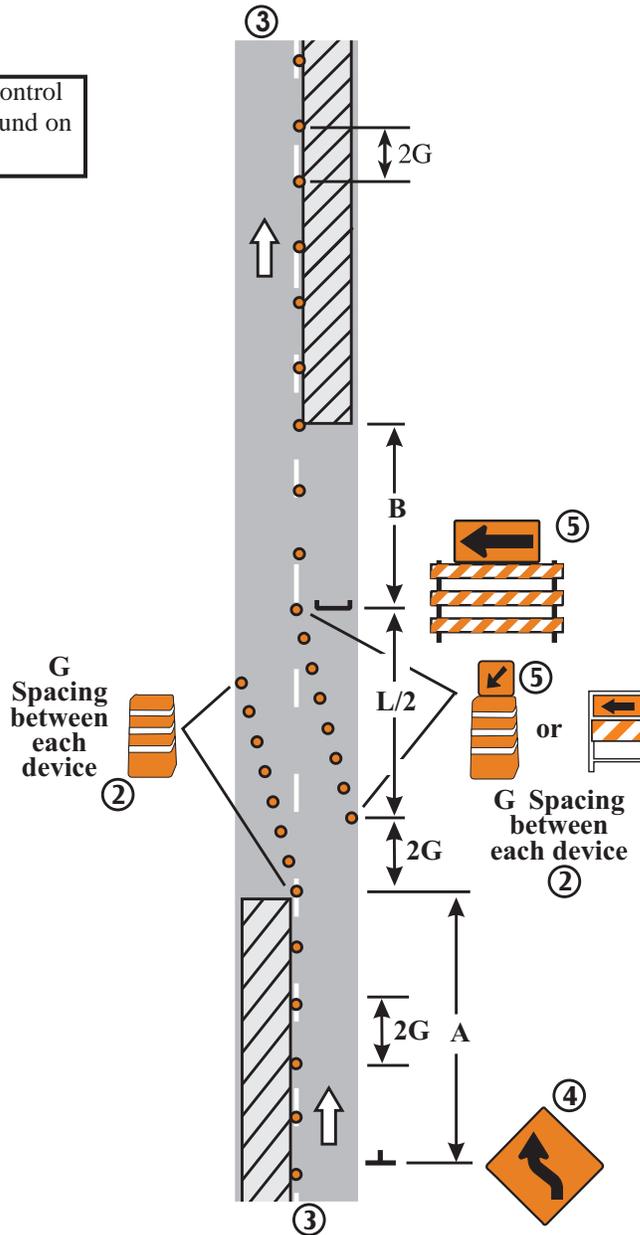
3 DAYS or LESS

LAYOUT 59

NOTES:

1. For one lane of traffic only.
2. Continue the pattern and the spacing of devices for additional lateral shift.
3. For advance signing, placement of traffic control devices, lane taper, see the appropriate stationary layout.
4. The Lane Shift sign may be omitted when the posted speed limit is 40 mph or less.
5. Directional arrows shall be used on either the drums or the Type III barricade

The Temporary Traffic Control Distance Charts can be found on page 6K-125



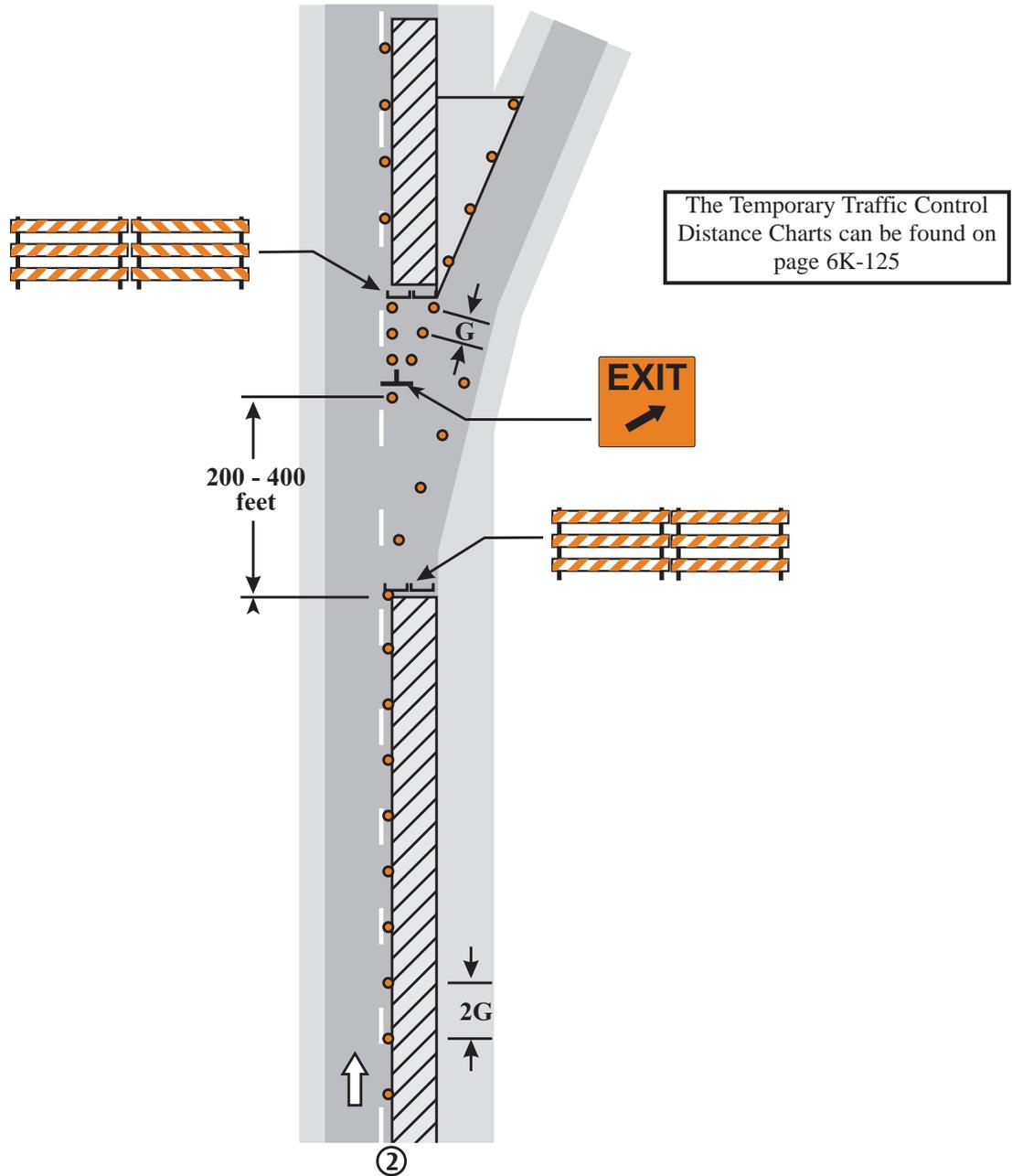
**LANE SHIFT  
MULTI-LANE DIVIDED OR ONE WAY ROAD**

3 DAYS or LESS

LAYOUT 60

NOTES:

1. Adjust the ramp exit to fit the conditions.
2. For advance signing, placement of traffic control devices, and lane closure, see the appropriate stationary layout.



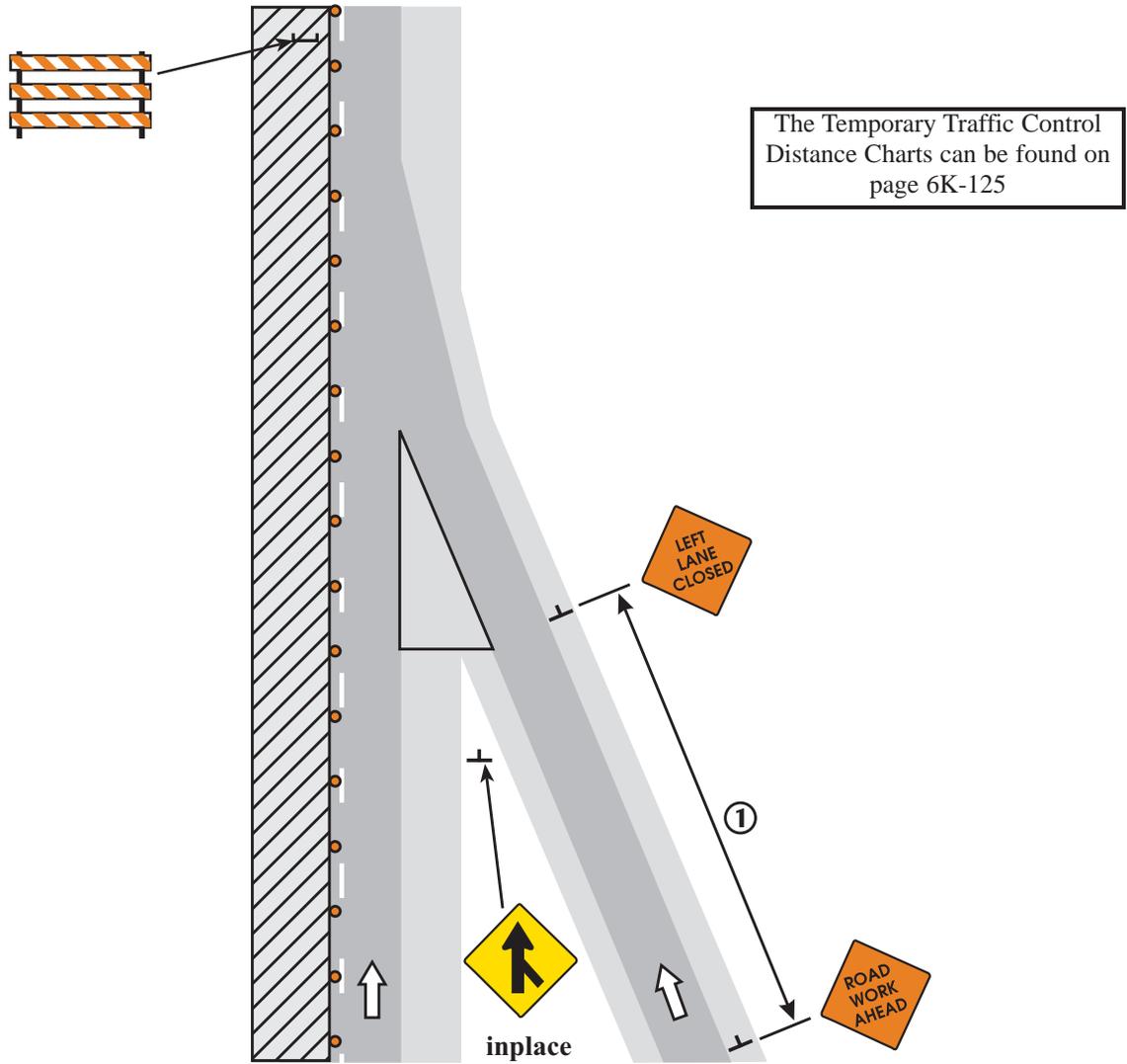
**MAINLINE RIGHT LANE CLOSED  
EXIT RAMP OPEN**

3 DAYS or LESS

LAYOUT 61

NOTES:

1. The advance warning sign spacing is dependent on the ramp length and the location of in-place signing. The spacing should be as long as is practical.



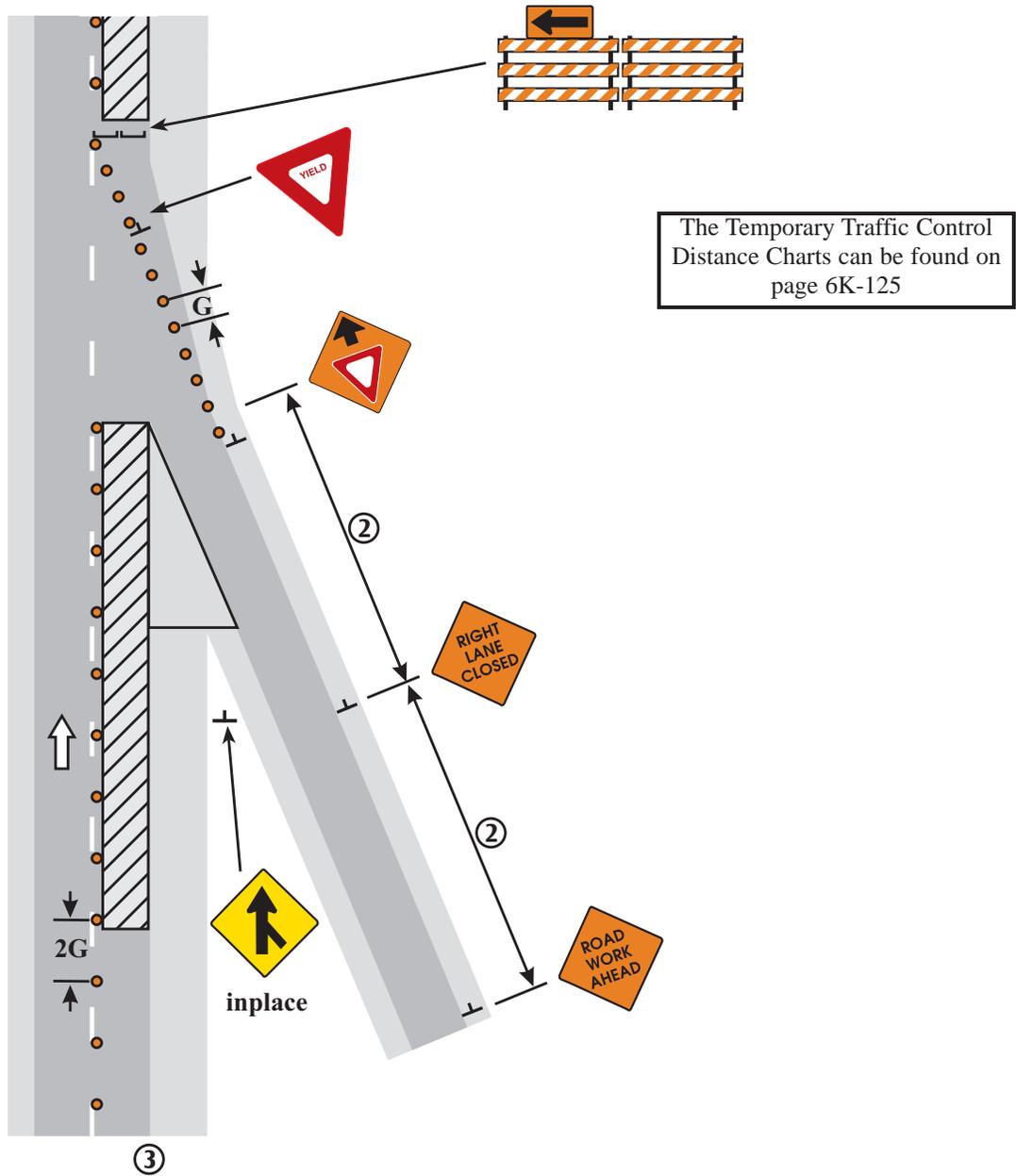
**MAINLINE LEFT LANE CLOSED  
ENTRANCE RAMP OPEN**

3 DAYS or LESS

LAYOUT 62

NOTES:

1. Adjust the ramp entrance to fit the conditions.
2. The advance warning sign spacing is dependent on the ramp length and the location of inplace signing. The spacing should be as long as is practical.
3. For advance signing, placement of traffic control devices, and lane closure, see the appropriate stationary layout.



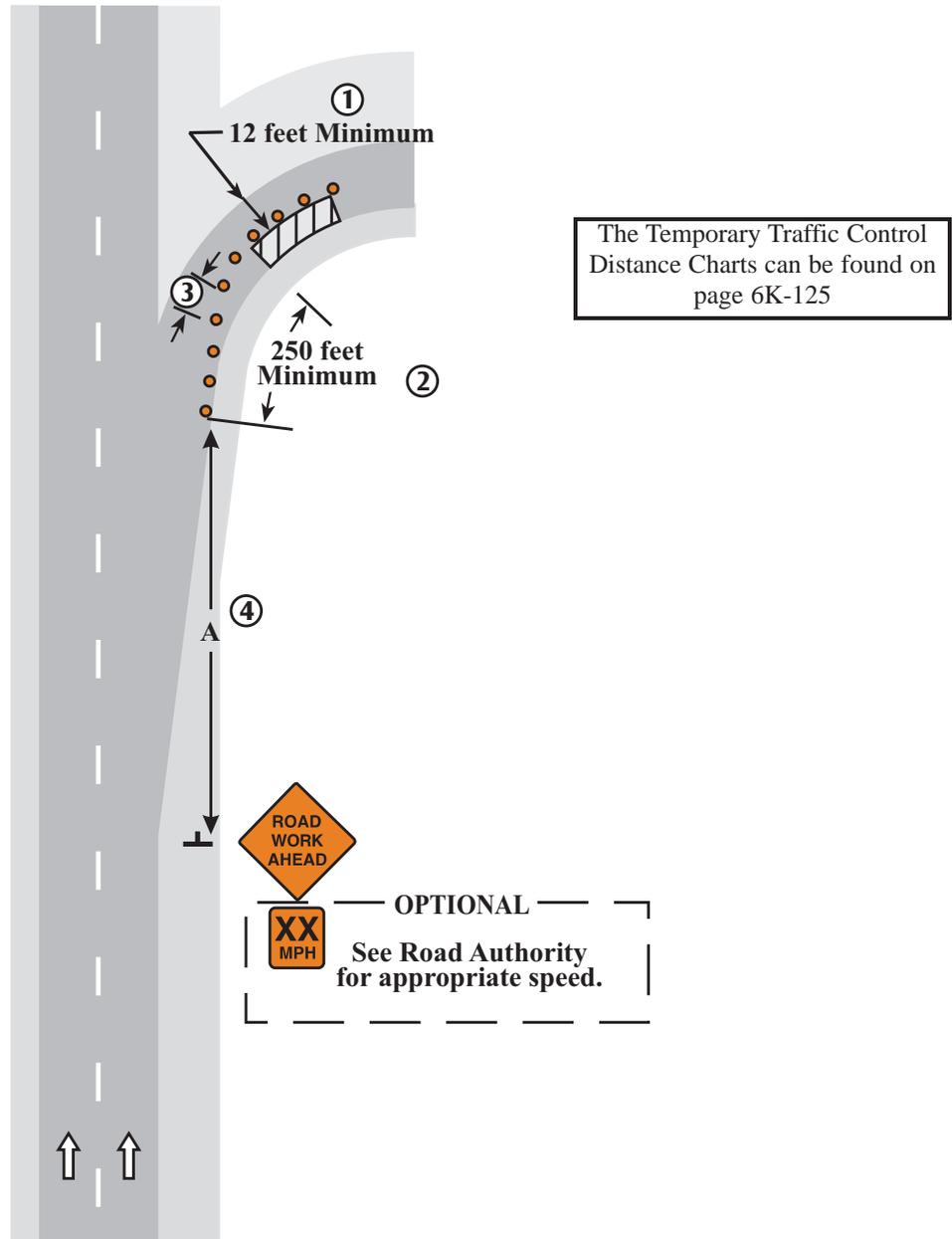
**MAINLINE RIGHT LANE CLOSED  
ENTRANCE RAMP OPEN**

3 DAYS or LESS

LAYOUT 63

NOTES:

1. Truck off-tracking should be considered when determining whether the 12 foot minimum lane width is adequate.
2. Use a minimum of a 250 foot taper.
3. For Loops use 25 foot spacing between devices.  
For Ramps use 50 foot spacing between devices.
4. The spacing for advance warning signs is dependent on the design of the interchange, and the location of inplace signing.



### PARTIAL RAMP CLOSURE

3 DAYS or LESS

LAYOUT 64



**This page has been intentionally left blank.**

**There is no Layout 66.**



Miscellaneous  
Layouts

# Miscellaneous Layouts

Layouts for Continuously Moving and  
Miscellaneous Signing Operations.

# MISCELLANEOUS LAYOUTS

Refer to the layouts for roadway type, volume, or speed limit restrictions.

## Miscellaneous Operations

Normally, these are continuously moving operations where the equipment operators remain inside/on the work vehicle.

	Layout No.
Pavement Marking - Two-Lane Roads	67, 68
Pavement Marking - Multi-Lane Roads	69, 70
Off Road Operation	71
Motor Grader - Gravel Road Maintenance	72
Flagging Cross-Roads and Blind Curves	86
Flagging Station Options	87
Lane Closure, Single Lane Roundabout	88
Left Lane Closure, 2 Lane Roundabout	89
Right Lane Closure, 2 Lane Roundabout	90

## Miscellaneous Signing

These are unusual layouts that may be used to warn motorists of unexpected roadway operations.

	Layout No.
Surfacing Operation at Intersection	74
Bump	73
Blasting	75
Multiple Work Spaces	74
Multiple Cross-Road Intersections	76
Advisory Speed Limits	77
Dynamic Speed Display Sign	78
Stopped Traffic Warning System	79

## Miscellaneous Closures

These are specialized layouts for closures or roadway or pedestrian facilities.

	Layout No.
2-Lane, 2-Way Road Closure	80, 81
Undivided, Multi-Lane Road Closure	82
Divided, Multi-Lane Closure	83
Sidewalk Detour	84

These Layouts as well as the entire Field Manual, the Flagging Handbook and other documents are available on the Mn/DOT, Traffic Engineering website at:

<http://www.dot.state.mn.us/trafficeng/>

**NOTES:**

1. All vehicles shall display two 360-degree yellow flashing vehicle lights or strobes.
2. The separation distance between the striper and the last shadow vehicle should be determined by the track free time of the pavement marking material.
3. Any vehicle(s) operated totally or partially in a high speed traffic lane should be equipped with a truck mounted attenuator.
4. If tracking of the wet paint is anticipated, the use of cones or stationary "Wet Paint" signs should be considered.

**FRONT FACING SIGNS**



All optional vehicles shall have the same signing as the striper.



**REAR FACING SIGNS**



The Temporary Traffic Control Distance Charts can be found on page 6K-125



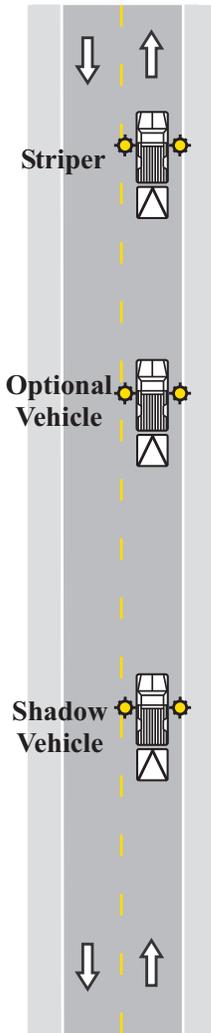
Select appropriate message



or



Select appropriate message



**STRIPING OPERATIONS  
TWO LANE TWO WAY ROAD**

15 MINUTES or LESS

LAYOUT 67

**NOTES:**

1. All vehicles shall display two 360-degree yellow flashing vehicle lights or strobes.
2. The separation distance between the striper and the last shadow vehicle should be determined by the track free time of the pavement marking material.
3. Any vehicle(s) operated totally or partially in a high speed traffic lane should be equipped with a truck mounted attenuator.
4. If tracking of the wet paint is anticipated, the use of cones or stationary "Wet Paint" signs should be considered.

**FRONT FACING SIGNS**



All optional vehicles shall have the same signing as the striper.

**OPTIONAL**



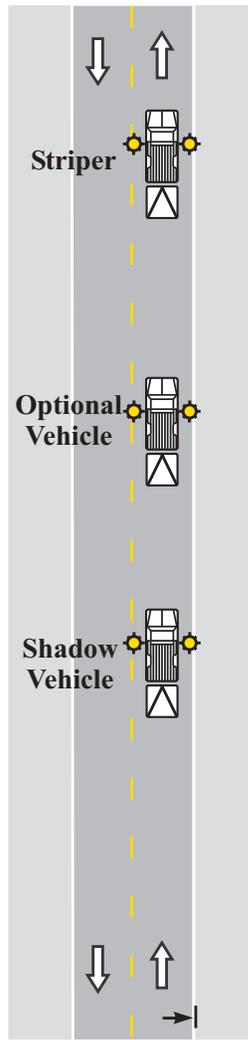
**REAR FACING SIGNS**



The Temporary Traffic Control Distance Charts can be found on page 6K-125



Select appropriate message



10 foot Minimum width

**STRIPING OPERATIONS  
TWO LANE TWO WAY ROAD - PASSING ON SHOULDER**

15 MINUTES or LESS

LAYOUT 68

**NOTES:**

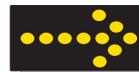
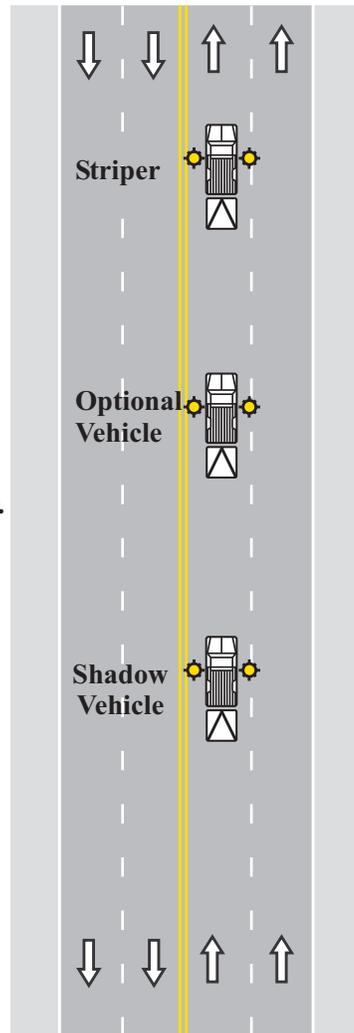
1. All vehicles shall display two 360-degree yellow flashing vehicle lights or strobes.
2. The separation distance between the striper and the last shadow vehicle should be determined by the track free time of the pavement marking material.
3. Any vehicle(s) operated totally or partially in a high speed traffic lane should be equipped with a truck mounted attenuator.
4. If tracking of the wet paint is anticipated, the use of cones or stationary "Wet Paint" signs should be considered.
5. Remove sign when operating this vehicle in the right lane.

**FRONT FACING SIGNS**



All optional vehicles shall have the same signing as the striper.

**REAR FACING SIGNS**



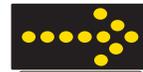
WET PAINT  
KEEP OFF  
LINES



WET PAINT  
OR  
WET YELLOW

Select appropriate message

The Temporary Traffic Control Distance Charts can be found on page 6K-125



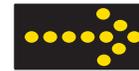
WET PAINT  
KEEP OFF  
LINES



WET PAINT  
OR  
WET YELLOW

OR  
WET WHITE

or



LANE  
CLOSED

and

NEXT  
1/2 MILE

Select appropriate message

**STRIPING OPERATIONS  
CENTERLINE - LANE LINE - EDGELINE STRIPING  
FOUR LANE UNDIVIDED ROAD**

15 MINUTES or LESS

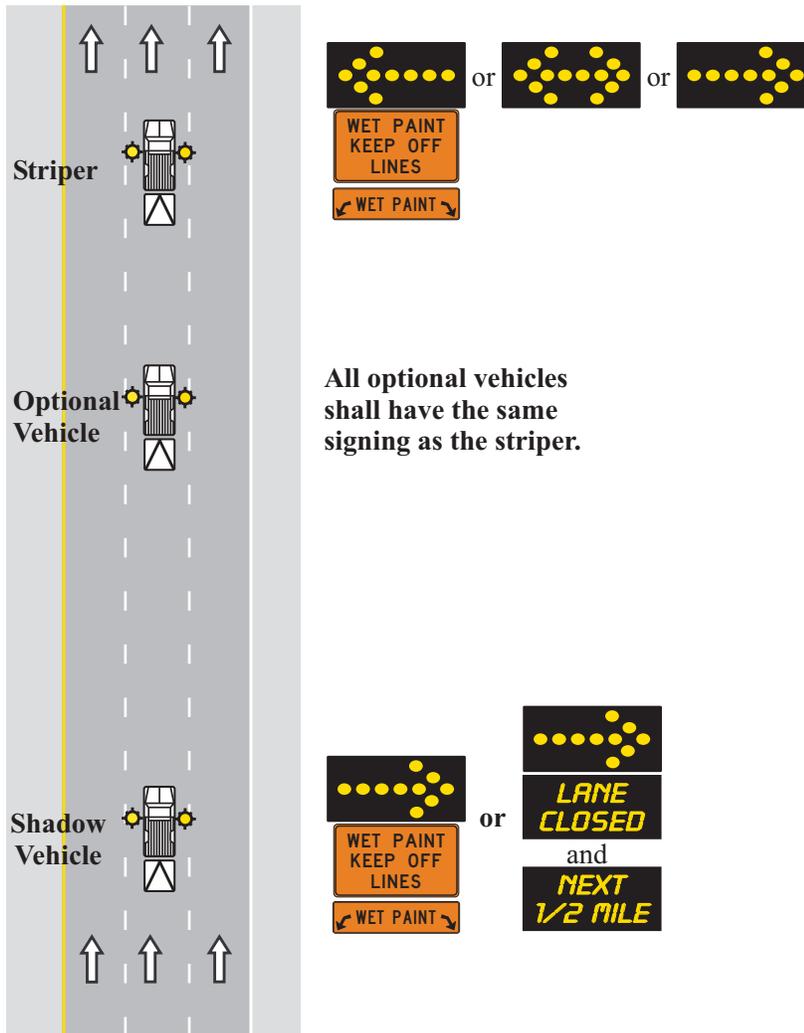
LAYOUT 69

NOTES:

1. All vehicles shall display two 360-degree yellow flashing vehicle lights or strobes.
2. The separation distance between the striper and the last shadow vehicle should be determined by the track free time of the pavement marking material.
3. Any vehicle(s) operated totally or partially in a high speed traffic lane should be equipped with a truck mounted attenuator.
4. If tracking of the wet paint is anticipated, the use of cones or stationary "Wet Paint" signs should be considered.

The Temporary Traffic Control Distance Charts can be found on page 6K-125

**REAR FACING SIGNS**



All optional vehicles shall have the same signing as the striper.

**STRIPING OPERATIONS  
LANE LINE STRIPING - CENTER LANE OPERATIONS  
MULTI-LANE DIVIDED ROAD**

15 MINUTES or LESS

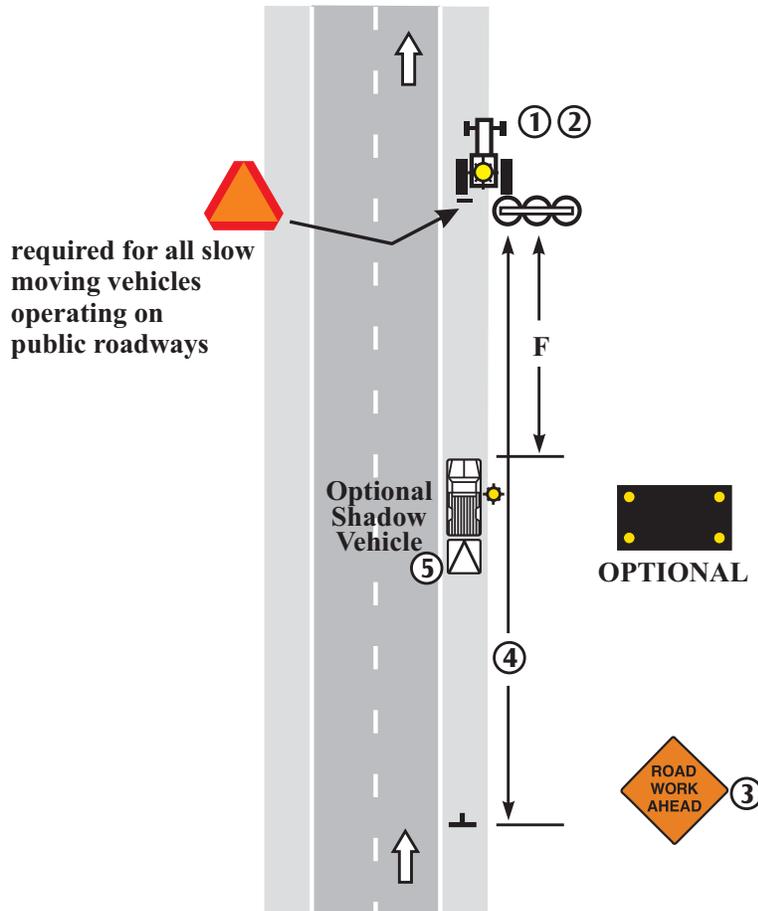
LAYOUT 70

NOTES:

1. The operations should be scheduled and completed during daylight work shifts and have little or no interference with traffic. The work should be suspended during periods of poor weather or visibility.
2. All vehicles shall be equipped with a flashing vehicle light visible 360-degrees around the vehicle when viewed from a distance of 60 feet.
3. The ROAD WORK AHEAD sign may be omitted when there is an adequate approach decision sight distance to the equipment along the majority of the route.
4. When advance warning signs are used, the signs should be no more than 3 miles from the work vehicle. The location of the signs should be determined by the sources of traffic, such as major cross roads.
5. On roadways where decision sight distance is restricted and the equipment must encroach into the traffic lane routinely, a shadow vehicle may be used as shown.

The Temporary Traffic Control Distance Charts can be found on page 6K-125

**SEE  
NOTE 5**



**WORK OFF ROADWAY  
MOBILE OPERATIONS HAVING LITTLE  
OR NO INTERFERENCE WITH TRAFFIC**

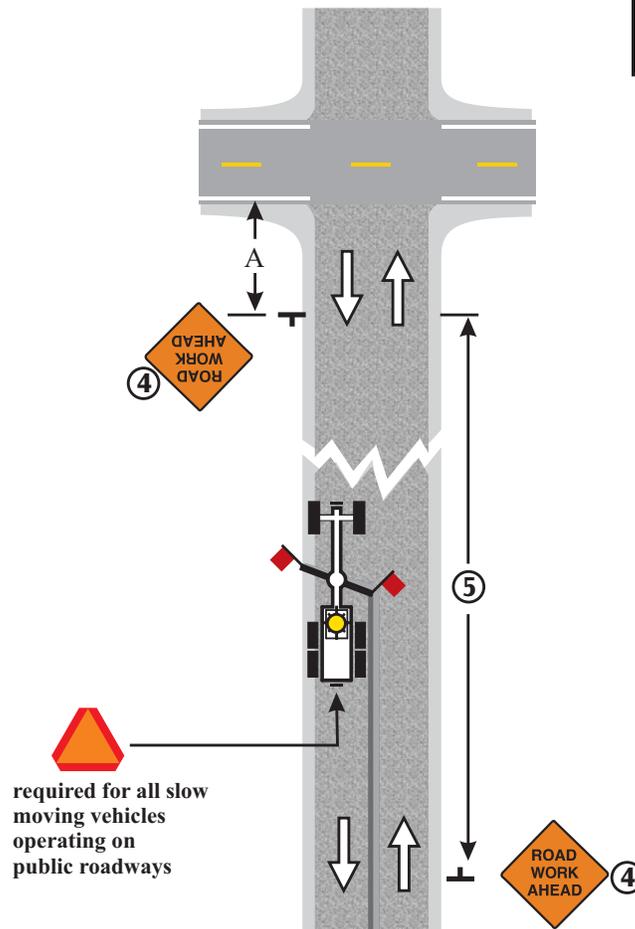
15 MINUTES or LESS

LAYOUT 71

NOTES:

1. Grading operations should be scheduled and completed during daylight work shifts. Work should be suspended during poor weather or visibility conditions.
2. Motor Graders shall be equipped with a flashing vehicle light visible 360 degrees around the vehicle when viewed from a distance of 60 feet.
3. Motor grader blade end(s) may be marked with red or orange flags to provide additional warning and make the equipment more visible to passing vehicles.
4. The ROAD WORK AHEAD signs may be omitted when there is an adequate approach decision sight distance to the motor grader along the majority of the route.
5. When advance warning signs are used, the signs should be no more than 3 miles from the work vehicle. The location of the signs should be determined by the sources of traffic, such as major cross roads.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



## GRAVEL ROAD MAINTENANCE GRADING OPERATIONS TWO LANE TWO WAY ROAD

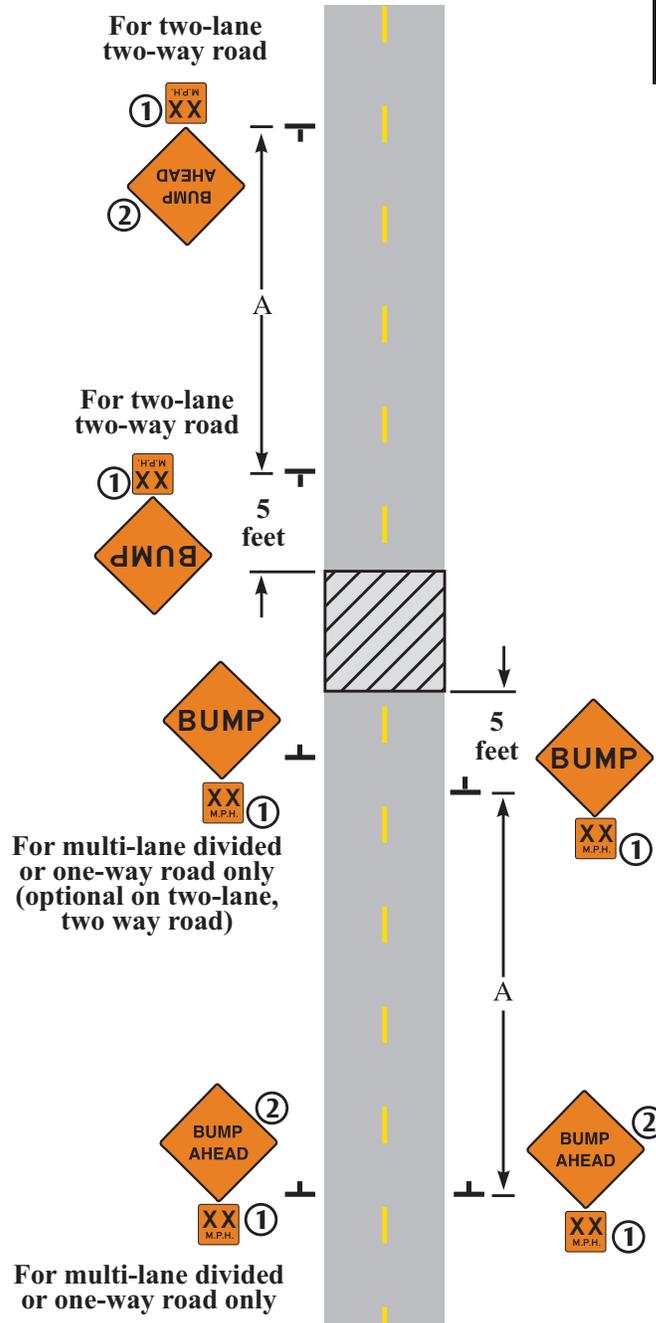
15 MINUTES or LESS

LAYOUT 72

NOTES:

1. When used, Advisory Speed plaques shall be installed below the appropriate warnings.
2. These devices may be omitted when the posted speed limit is 40 mph or less.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**TYPICAL BUMP SIGNING**

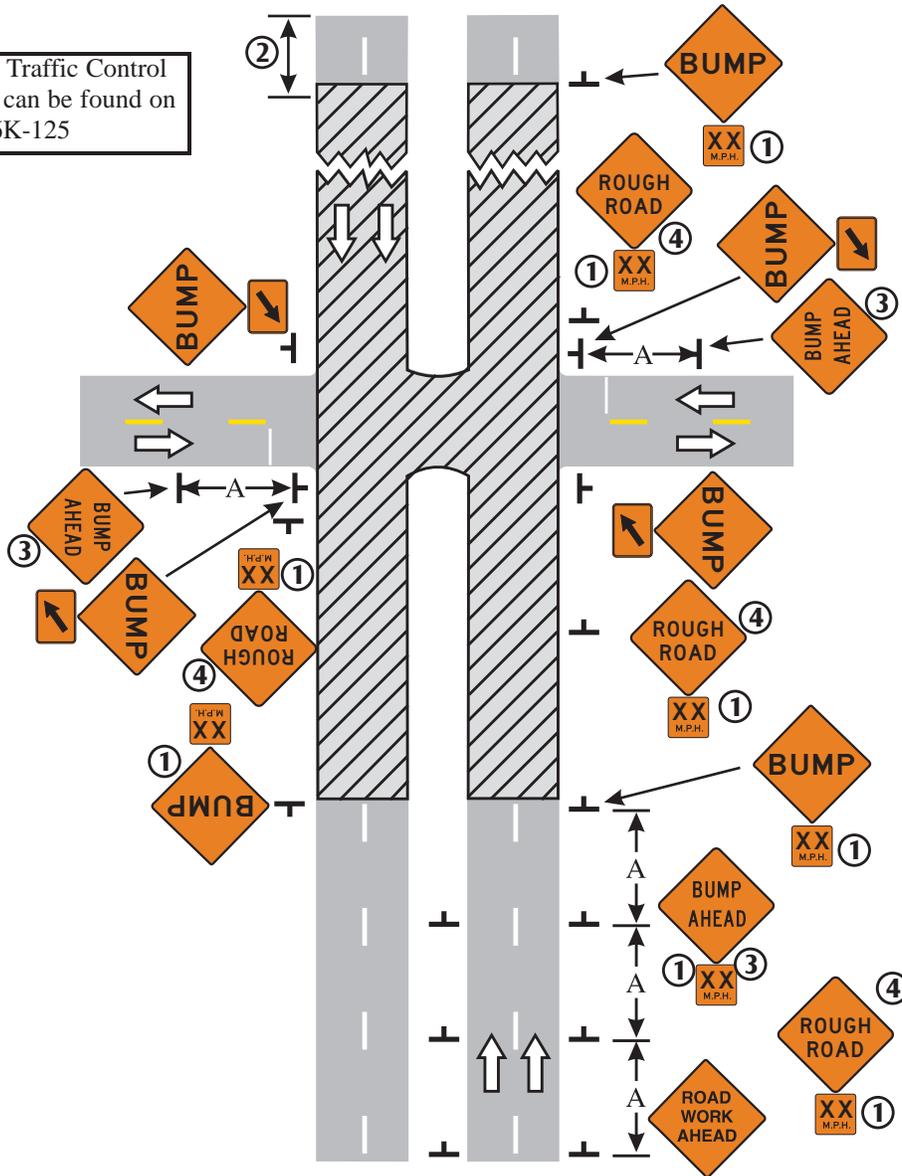
3 DAYS or LESS

LAYOUT 73

NOTES:

1. When used, Advisory Speed plaques shall be installed below the appropriate warnings.
2. Use the same advance warning signs and spacings for the other approach to the milled roadway surface area.
3. The BUMP AHEAD and Advisory Speed plaque may be omitted when the posted speed is 40 mph or less.
4. Use the appropriate advance warning sign for the roadway condition, i.e. GROOVED PAVEMENT, LOOSE GRAVEL, ROUGH ROAD, STEEL PLATE AHEAD. A Motorcycle plaque may be installed below the appropriate advance warning sign if the warning is directed primarily to motorcyclists.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**RE-SURFACING OPERATION  
WORK SPACE BEFORE AND THRU INTERSECTION  
MULTI-LANE DIVIDED ROAD**

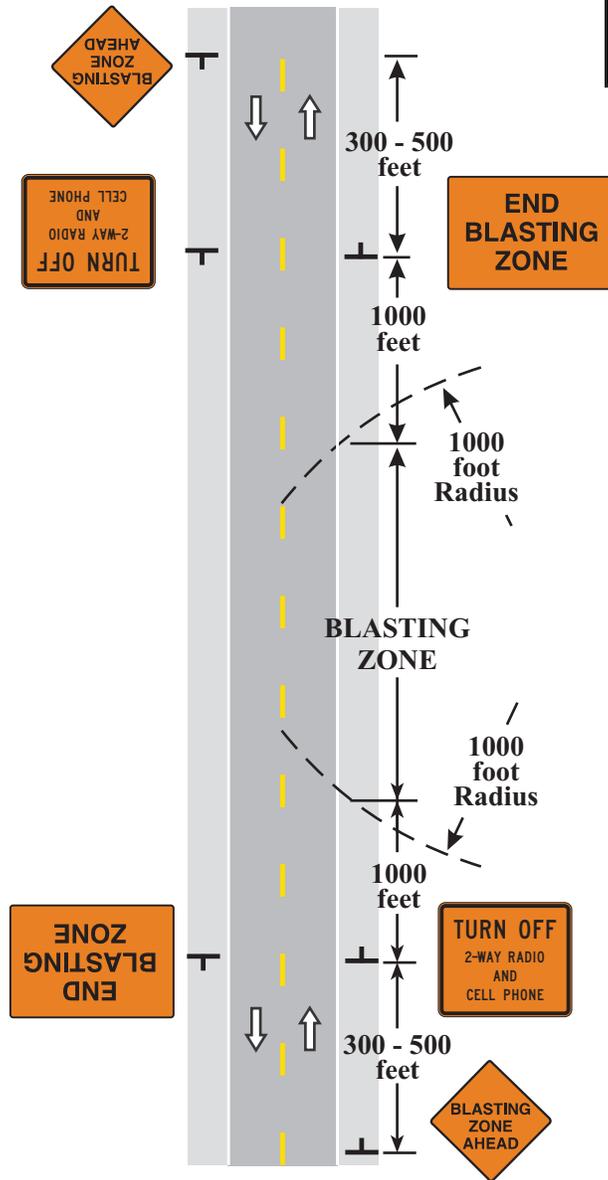
3 DAYS or LESS

LAYOUT 74

NOTES:

1. Whenever electric blasting caps are used for blasting within 1000 feet of a roadway, the signing shown shall be used. On a divided highway, the signs should be installed on both sides of the directional roadways.
2. The signs shall be covered or removed when there are no explosives in the area or the area is otherwise secure.
3. Any intersecting road within the 1000-foot radius of the blasting area shall be signed in a similar manner.
4. Prior to blasting, the blaster in charge shall determine whether highway traffic in the blasting zone will be endangered by the blasting operation. If there is danger, highway traffic will not be permitted to pass through the blasting zone during blasting operations. See Layouts 81, 82, or 83.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



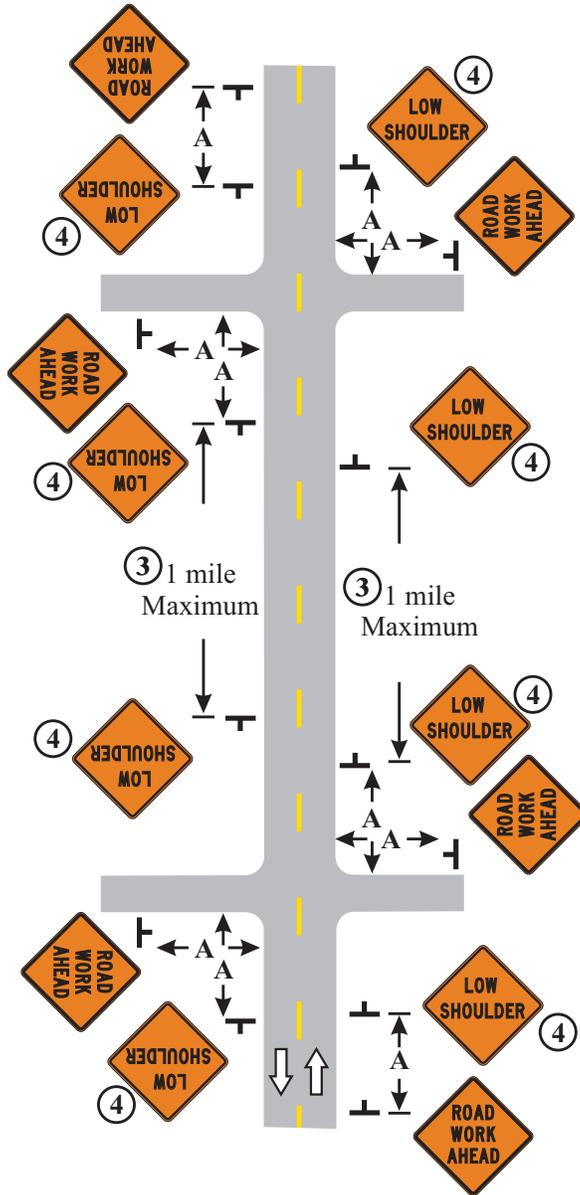
**BLASTING ZONE**

3 DAYS or LESS

LAYOUT 75

NOTES:

1. This layout should be used for those stationary temporary traffic control zones that extend over a relatively long segment of roadway.
2. The appropriate layout shall be used for the active work space (such as area of paving, etc).
3. Confirmation signing for a continuous condition should be placed at approximately 1 mile spacing.
4. Use the appropriate advance warning sign for the roadway condition, i.e. GROOVED PAVEMENT, LOOSE GRAVEL, ROUGH ROAD STEEL PLATE AHEAD.  
A Motorcycle plaque may be installed below the appropriate advance warning sign if the warning is directed primarily to motorcyclists.



**CROSSROAD & CONFIRMATION SIGNING  
TRAFFIC CONTROL ZONE**

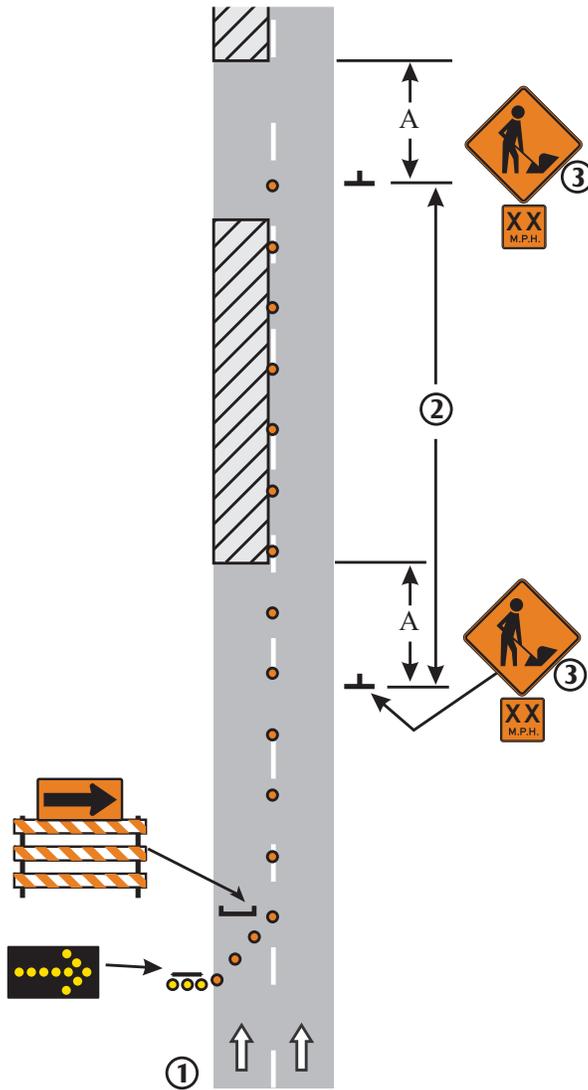
3 DAYS or LESS

LAYOUT 76

Notes:

1. Use the appropriate layout for channelizing, advance signing, and spacing.
2. In long work zones, this sign assembly may be repeated before each worker area.
3. If used, an Advisory Speed Limit plaque shall be installed beneath the Worker Ahead symbol sign or the appropriate advance warning sign(s).
4. The advisory speed value shall not be higher than any in-place regulatory speed limit.
5. An advance warning sign with an Advisory Speed Limit plaque should not be placed near a regulatory speed sign.
6. See “*Work Zone Speed Limit Guidelines*” for more information on work zone speed limits.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**ADVISORY SPEED LIMIT  
MULTI-LANE ROAD**

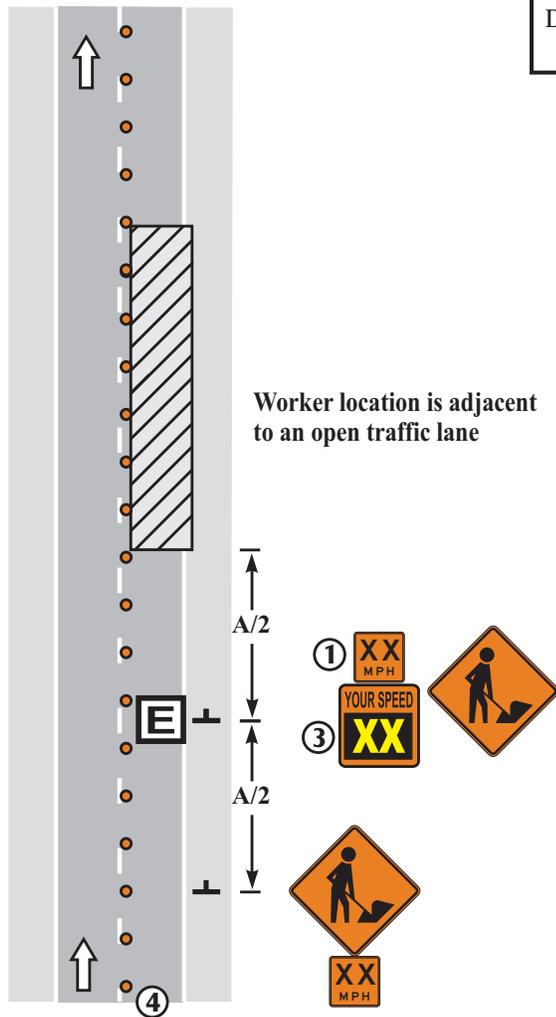
12 HOURS or LESS

LAYOUT 77

NOTES:

1. The advisory speed plaque and appropriate warning sign should be located near the Dynamic Speed Display (DSD) (also known as "YOUR SPEED") sign, but may be up to a maximum of 100 feet ahead if found necessary.
2. The advisory speed plaque shall be removed when workers are not present, and the DSD sign should be removed, disabled, or re-programmed for the posted speed limit.
3. If the DSD sign is used with a regulatory speed limit (black on white sign), then the "YOUR SPEED" sign on the DSD device shall also be black legend on a white background.
4. TTC devices required to closed the traffic lane have not been shown.
5. Refer to the "Work Zone Speed Limit Guidelines" for additional guidance on setting Advisory Speed Limits and optimum layout distances.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**DYNAMIC SPEED DISPLAY SIGN  
(YOUR SPEED SIGN)**

12 HOURS or LESS

LAYOUT 78

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NOTES:

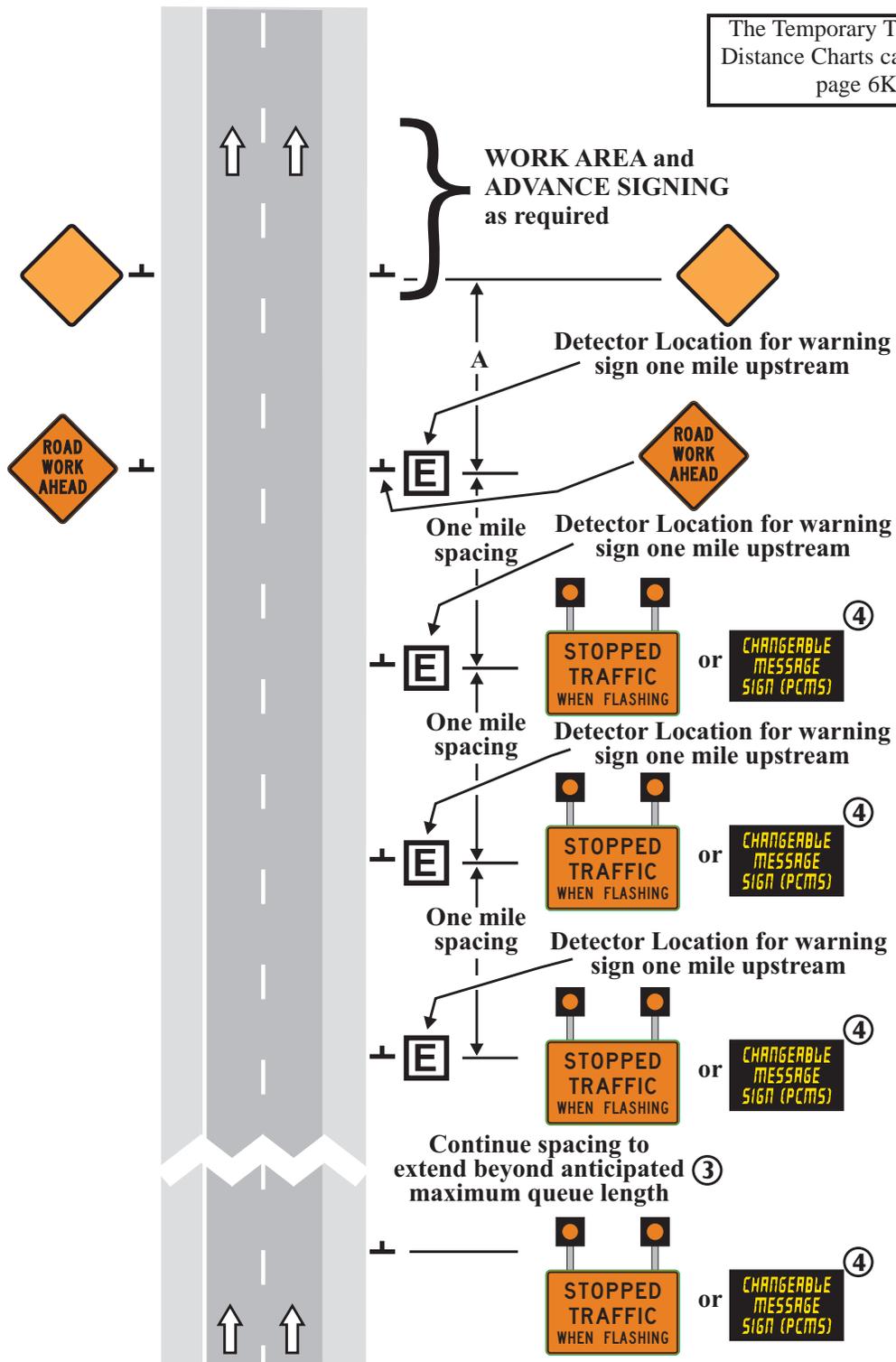
1. The layout only shows the additional signs and devices required to setup a Stopped Traffic System. See other Temporary Traffic Control layouts for the proper temporary traffic control devices beyond the ROAD WORK AHEAD signs.
2. The STOPPED TRAFFIC WHEN FLASHING signs or the PCMS should activate and deactivate when the downstream detector senses average traffic speeds meeting threshold values as set by the engineer. A maximum one minute average speed drop of 20 mph or more below the posted speed limit (posted prior to road work in the queue area) may typically be used for a threshold value on high speed roadways. To deactivate the signage, the maximum one minute average speed typically should recover to within 10 mph of the posted speed limit or higher.
3. The estimated maximum queue length may be determined by engineering analysis or previous experience, and should be reviewed and field adjusted to fit actual traffic conditions such that the first warning device is upstream of the queue.
4. When PCMS devices are used, the two part message should read: STOPPED TRAFFIC - - PREPARE TO STOP and the PCMS may be used for other appropriate messages whenever the stopped traffic message is not required.

**STOPPED TRAFFIC AHEAD WARNING SYSTEM**  
**Layout 79a**

3 DAYS or LESS

LAYOUT 79a & b

The Temporary Traffic Control Distance Charts can be found on page 6K-125



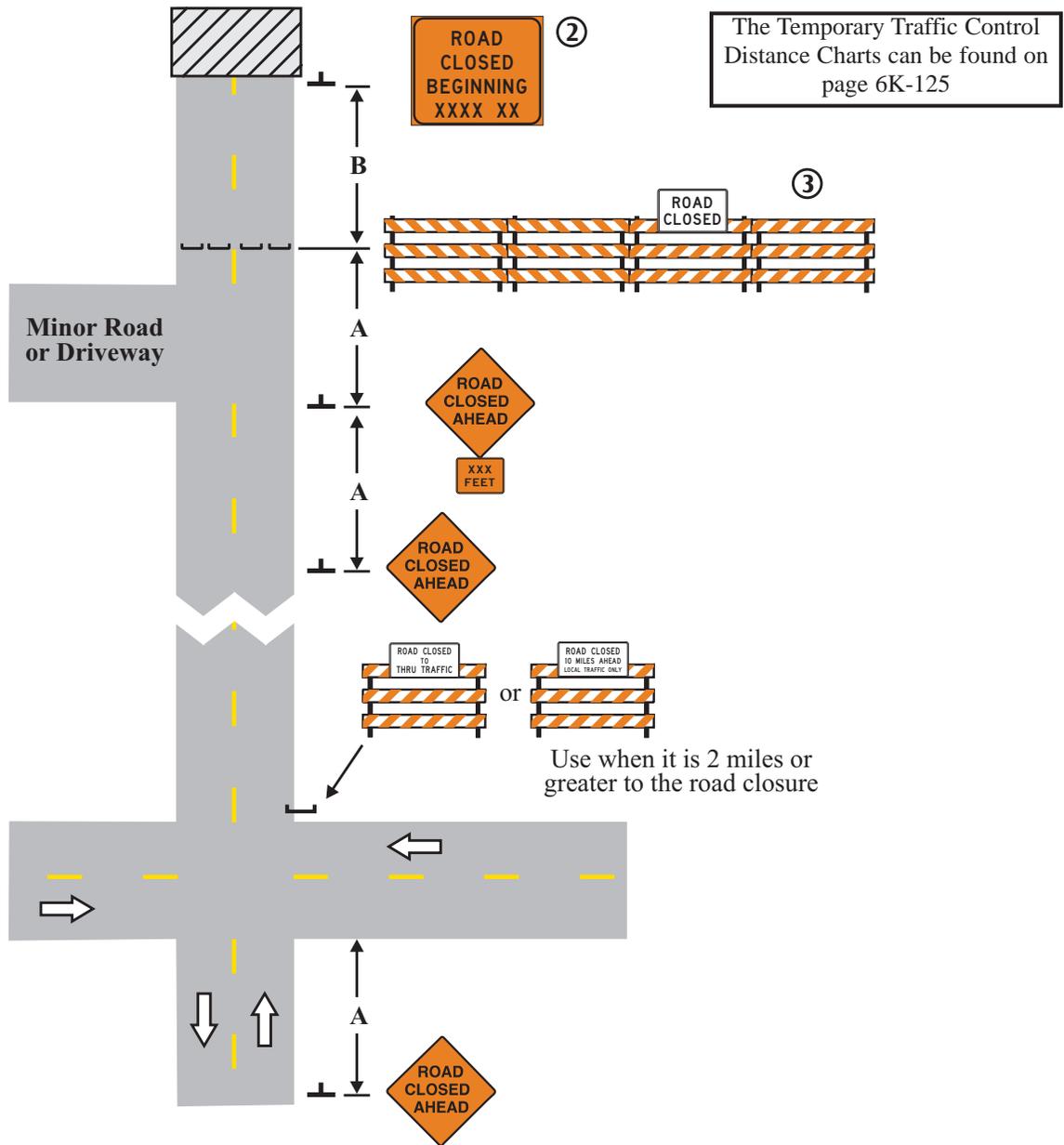
## STOPPED TRAFFIC AHEAD WARNING SYSTEM Layout 79b

3 DAYS or LESS

LAYOUT 79a & b

NOTES:

1. The Road Authority will determine if a detour is required and specify the detour route.
2. Road Closure Notice sign should be installed seven days in advance of the closure.
3. Install at the last driveway or intersection beyond which there is no public access.



**ROAD CLOSURE**

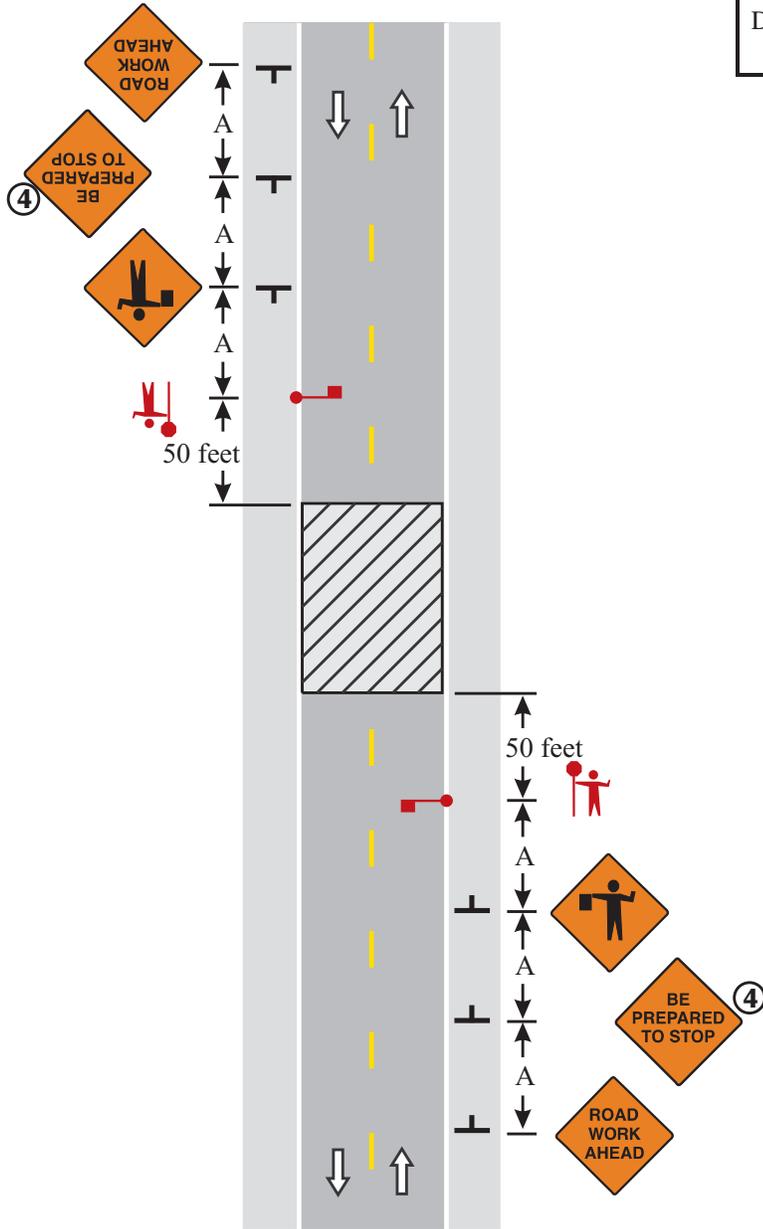
3 DAYS or LESS

LAYOUT 80

NOTES:

1. The traffic from both lanes should not be stopped for more than 15 minutes.
2. Conditions represented are for work during daytime hours only.
3. For night closures, the following should be used:
  - a. Law enforcement officers with squad car for flaggers.
  - b. A changeable message sign in each direction.
4. The BE PREPARED TO STOP sign may be omitted when the posted speed limit is 40 mph or less.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**TEMPORARY ROAD CLOSURE  
TWO LANE TWO WAY ROAD**

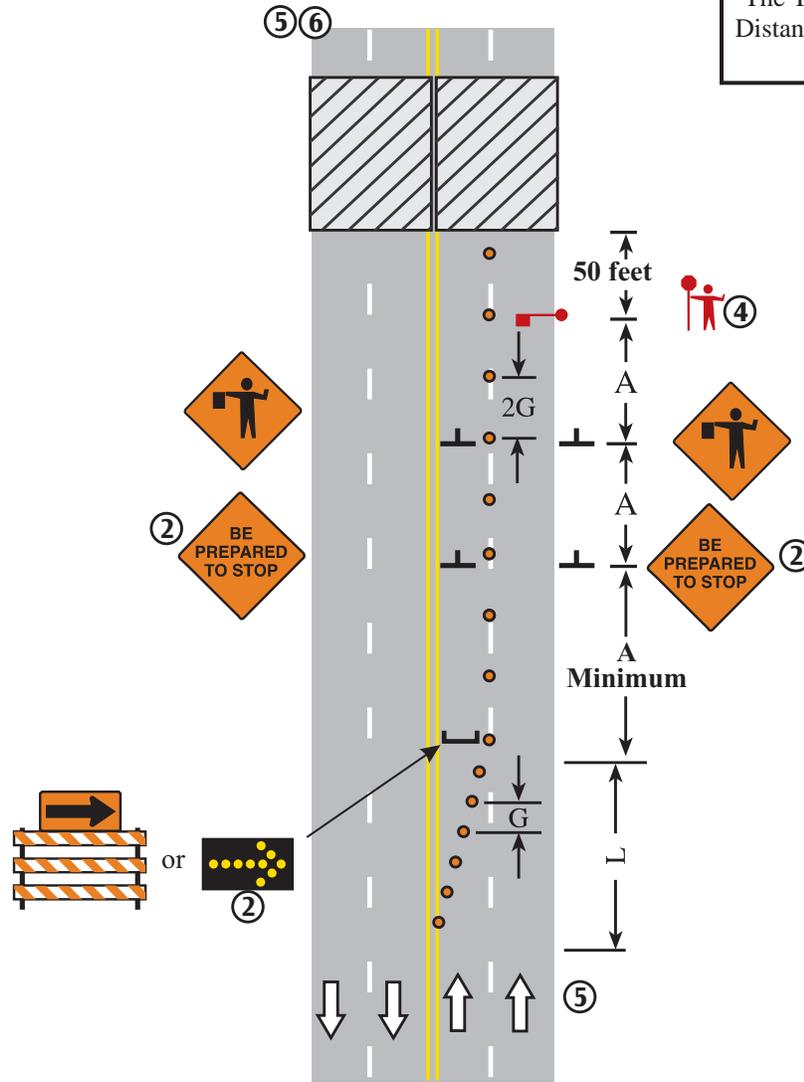
15 MINUTES or LESS

LAYOUT 81

NOTES:

1. The traffic from both lanes should not be stopped for more than 15 minutes.
2. The BE PREPARED TO STOP sign and the flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
3. For roads with 3 or more lanes of traffic in one direction, use the appropriate stationary layout.
4. A law enforcement officer with squad car shall be used instead of a flagger during night operations.
5. Advance traffic control devices for a left lane closure shall be as shown in Layouts 34 or 35.
6. The advance warning sign sequence is shown for one way direction only. The other direction shall be identical.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**TEMPORARY ROAD CLOSURE  
MULTI-LANE UNDIVIDED ROAD**

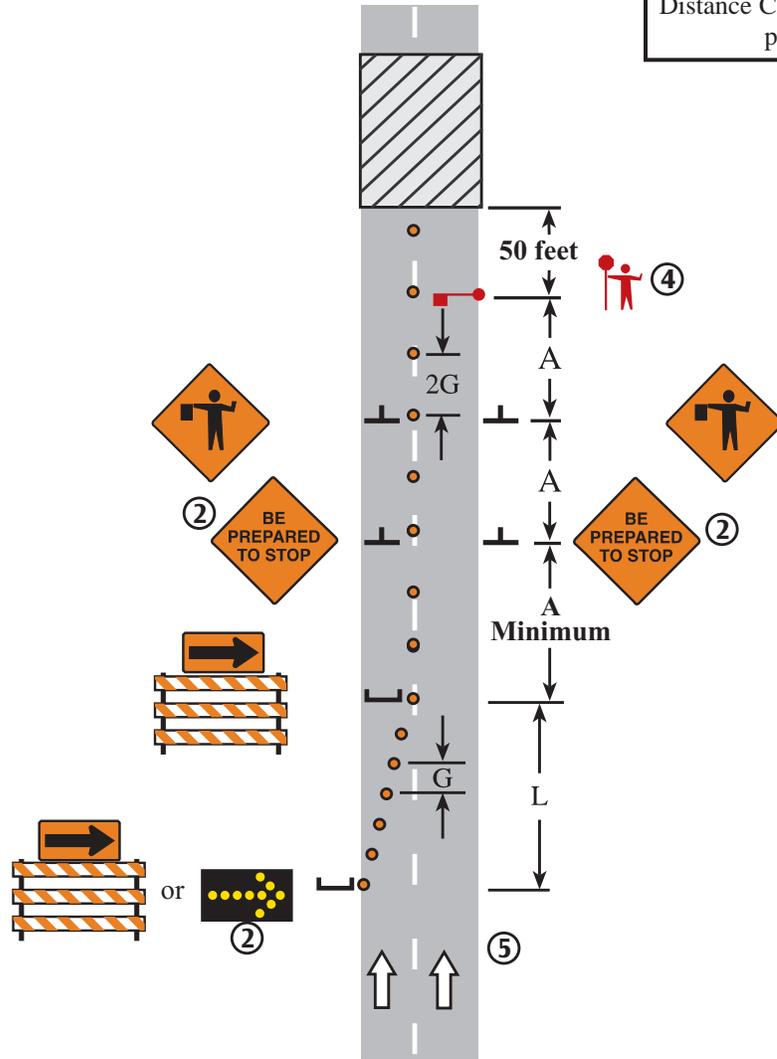
15 MINUTES or LESS

LAYOUT 82

NOTES:

1. The traffic from both lanes should not be stopped for more than 15 minutes.
2. The BE PREPARED TO STOP sign and the flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
3. For roads with 3 or more lanes of traffic in one direction, use the appropriate stationary layout.
4. A law enforcement officer with squad car shall be used instead of a flagger during night operations.
5. Advance traffic control devices for a left lane closure shall be as shown in Layout 52.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**TEMPORARY ROAD CLOSURE  
MULTI-LANE DIVIDED ROAD**

15 MINUTES or LESS

LAYOUT 83

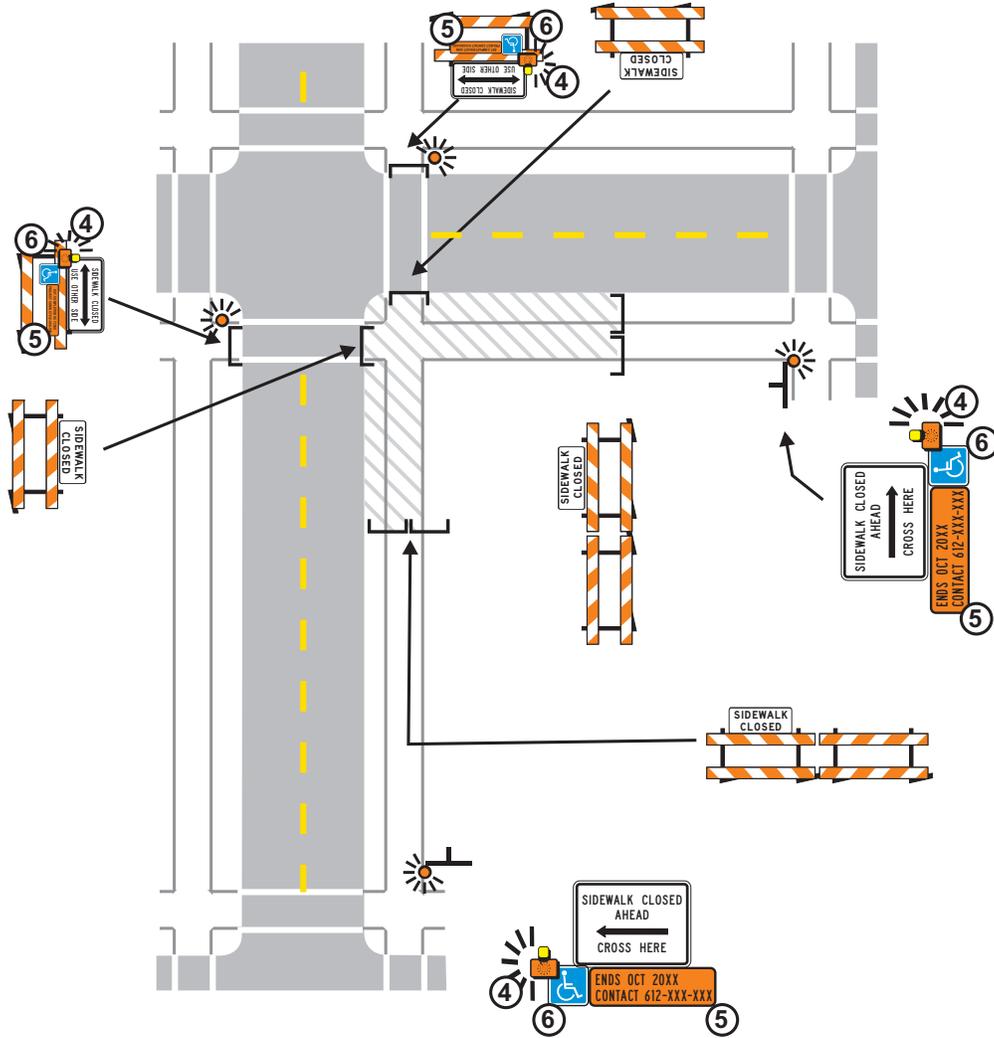
## NOTES:

1. When crosswalks, sidewalks or other pedestrian facilities are blocked, closed or relocated, temporary facilities shall include accessibility features consistent with the features present in the existing pedestrian facility.
2. The examples show only key typical dimensions. Refer to the MnDOT Temporary Pedestrian Access Route (TPAR) website (<http://www.dot.state.mn.us/trafficeng/workzone/tpar.html>) for standards, guidance and options when blocking, closing, or relocating pedestrian facilities.
3. Only traffic control devices controlling pedestrian flows are shown. Other devices may be needed to control traffic on the streets.
4. An approved audible message device or tactile message should be provided for sight-impaired pedestrians. When used, a message device should provide a complete physical description of the temporary pedestrian detour including duration, length of (and/or distance to) the by-pass, any restrictions or hazards and project information as listed in note 5 below. The number and location of devices should be determined for each project prior to starting work. Devices may be placed prior to sidewalk work to warn regular users of the planned work.
5. Typical sign message for a temporary pedestrian detour should include information such as the duration of the walkway restrictions (beginning and/or end dates) and a project contact number for 24/7 questions or reporting hazards.
6. The International Symbol of Accessibility should be displayed when any walkway through a work zone has been determined to be TPAR compliant. The Symbol of Accessibility shall not be displayed if persons with disabilities should not use the primary temporary pedestrian detour. The reason for the non-compliance should be posted and an alternate route should be posted when the primary temporary pedestrian detour is non-complaint to TPAR standards.
7. Conditions that are beyond recommended standards should be documented. A walkway is non-compliant if it is missing key ADA elements such as curb ramp(s), truncated domes, and detectable edging. Other restrictions or hazards may include insufficient width or pinch-point widths, traffic conflicts, steep grades, non-continuous railings, tripping hazards, or uneven/rough/soft surface conditions, etc.
8. Pedestrian traffic signal displays controlling closed crosswalks shall be covered.
9. Pedestrian detour trailblazing signs should be used if the pedestrian detour is located someplace other than across the street from the sidewalk closure.

## **CROSSWALK CLOSURES AND PEDESTRIAN DETOURS LAYOUT 84a**

3 DAYS or LESS

LAYOUT 84a & b



## CROSSWALK CLOSURES AND PEDESTRIAN DETOURS LAYOUT 84b

3 DAYS or LESS

LAYOUT 84a & b

NOTES:

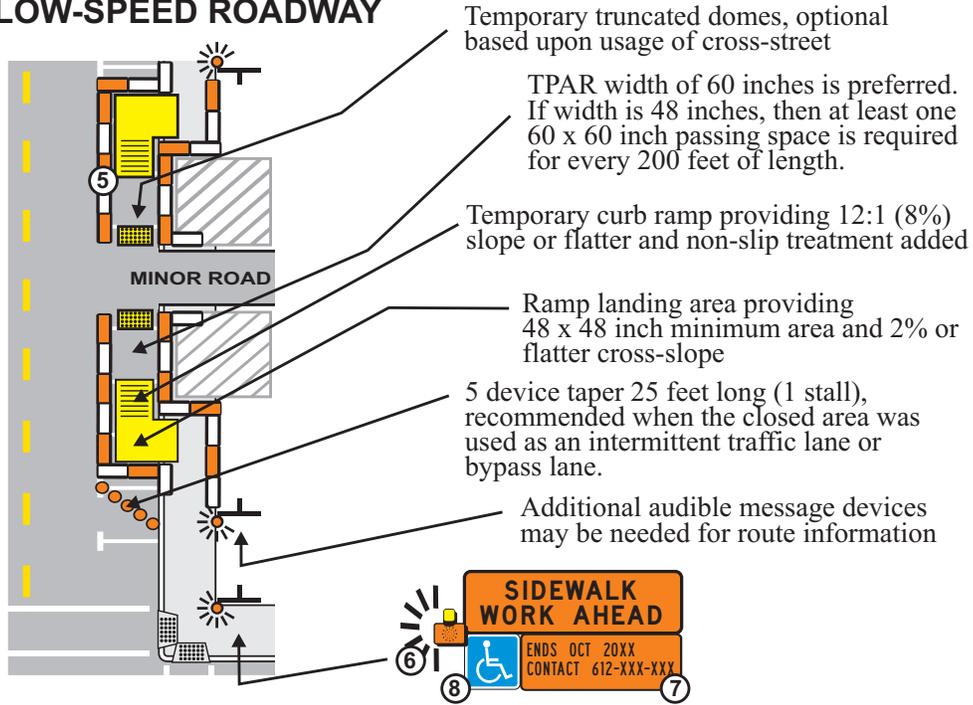
1. When crosswalks, sidewalks or other pedestrian facilities are blocked, closed or relocated, temporary facilities shall include accessibility features consistent with the features present in the existing pedestrian facility.
2. The examples show only key typical dimensions. Refer to the MnDOT Temporary Pedestrian Access Route (TPAR) website (<http://www.dot.state.mn.us/trafficeng/workzone/tpar.html>) for standards, guidance and options when blocking, closing, or relocating pedestrian facilities.
3. Where high speeds and/or high traffic volumes are anticipated, barrier should be used to separate the temporary pedestrian walkway from vehicular traffic. When used, barriers shall be installed as detailed in the MN MUTCD Part 6F.
4. Only traffic control devices controlling pedestrian flows are shown. Other devices may be needed to control traffic on the streets.
5. When both sides of a temporary pedestrian bypass require channelizing devices, then the devices should be a similar type (railing system, barricade, or fencing system), excluding when a barrier (such as concrete barrier) is used to protect pedestrians from an open traffic lane.
6. An approved audible message device or tactile message should be provided for sight-impaired pedestrians. When used, a message device should provide a complete physical description of the temporary pedestrian by-pass including duration, length of (and/or distance to) the bypass, any restrictions or hazards and project information as listed in note 7 below. The message device(s) may also describe an alternate route. The number and location of devices should be determined for each project prior to starting work. Devices may be placed prior to sidewalk work to warn regular users of the planned work.
7. Typical sign message for a temporary pedestrian bypass should include information such as the duration of the walkway restrictions (beginning and/or end dates) and a project contact number for 24/7 questions or reporting hazards.
8. The International Symbol of Accessibility should be displayed when any walkway through a work zone has been determined to be TPAR compliant. The Symbol of Accessibility shall not be displayed if persons with disabilities should not enter the temporary pedestrian by-pass. An alternate route should be posted when the temporary pedestrian bypass is non-complaint to TPAR standards.
9. Conditions that are beyond recommended standards should be documented. A walkway is non-compliant if it is missing key ADA elements such as curb ramp(s), truncated domes, and detectable edging. Other restrictions or hazards may include insufficient width or pinch-point widths, traffic conflicts, steep grades, non-continuous railings, tripping hazards, or uneven/rough/soft surface conditions, etc.
10. When a sidewalk is closed but workers are present who will provide assistance or directions to pedestrians, then the devices as shown are not required.

**SIDEWALK BY-PASS  
LAYOUT 85a**

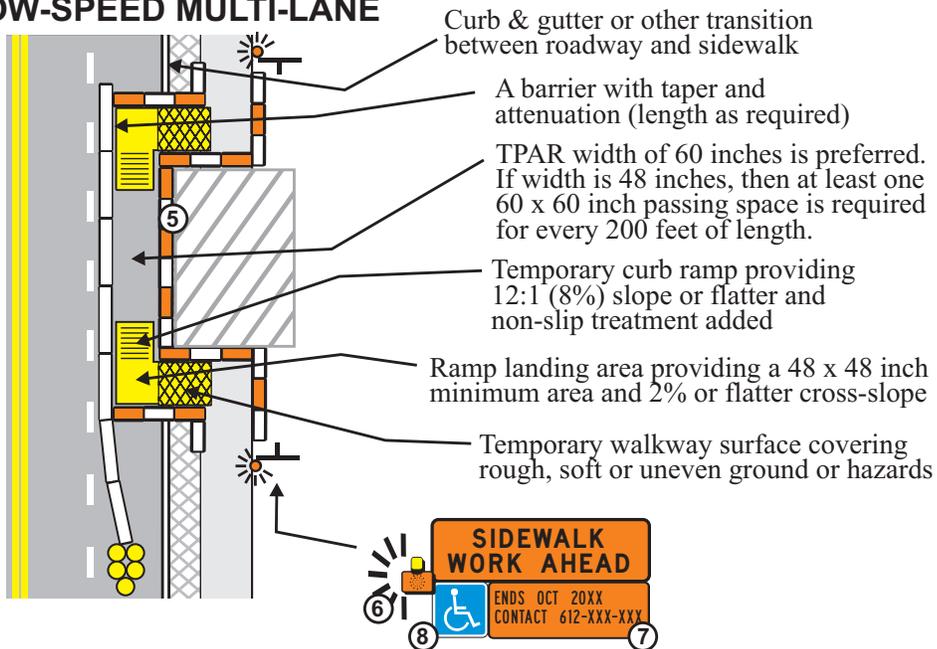
3 DAYS or LESS

LAYOUT 85a & b

## LOW-SPEED ROADWAY



## HIGH-SPEED ROADWAY or LOW-SPEED MULTI-LANE



## SIDEWALK BY-PASS LAYOUT 85b

3 DAYS or LESS

LAYOUT 85a & b

NOTE:

1. Approach signs are the same in both directions.
2. Full flagging station signing and pilot car turn-around areas shall be located at both ends of the work area.
3. When a flagger is positioned at a low volume intersection, they:
  - shall have 2-way radio communications with the pilot car; and
  - may need additional flaggers to direct traffic when the crossroad consistently has multiple vehicles per direction waiting each pilot car cycle.
4. A flagger may be placed at a blind curve, crest of a hill or other site obstruction where traffic might enter from other driveways or entrances to warn the pilot car that there may be oncoming traffic.  
When used, the flagger:
  - shall be located to clearly see traffic from both directions;
  - shall not be positioned in the open traffic lane;
  - shall have 2-way radio communications with the pilot car;
  - shall have a flagger paddle; and
  - should have a means to warn an errant driver such as a air horn.
5. This sign may be used in work areas where pilot car brochures have been distributed to the local residents and businesses.
6. This sign shall be mounted on the pilot car.
7. Channelizers shall be placed near intersections and flagging stations.
8. Channelizers are optional with pilot car operations.
9. The two-way taper should be 50 feet using 5 equally spaced channelizing devices.

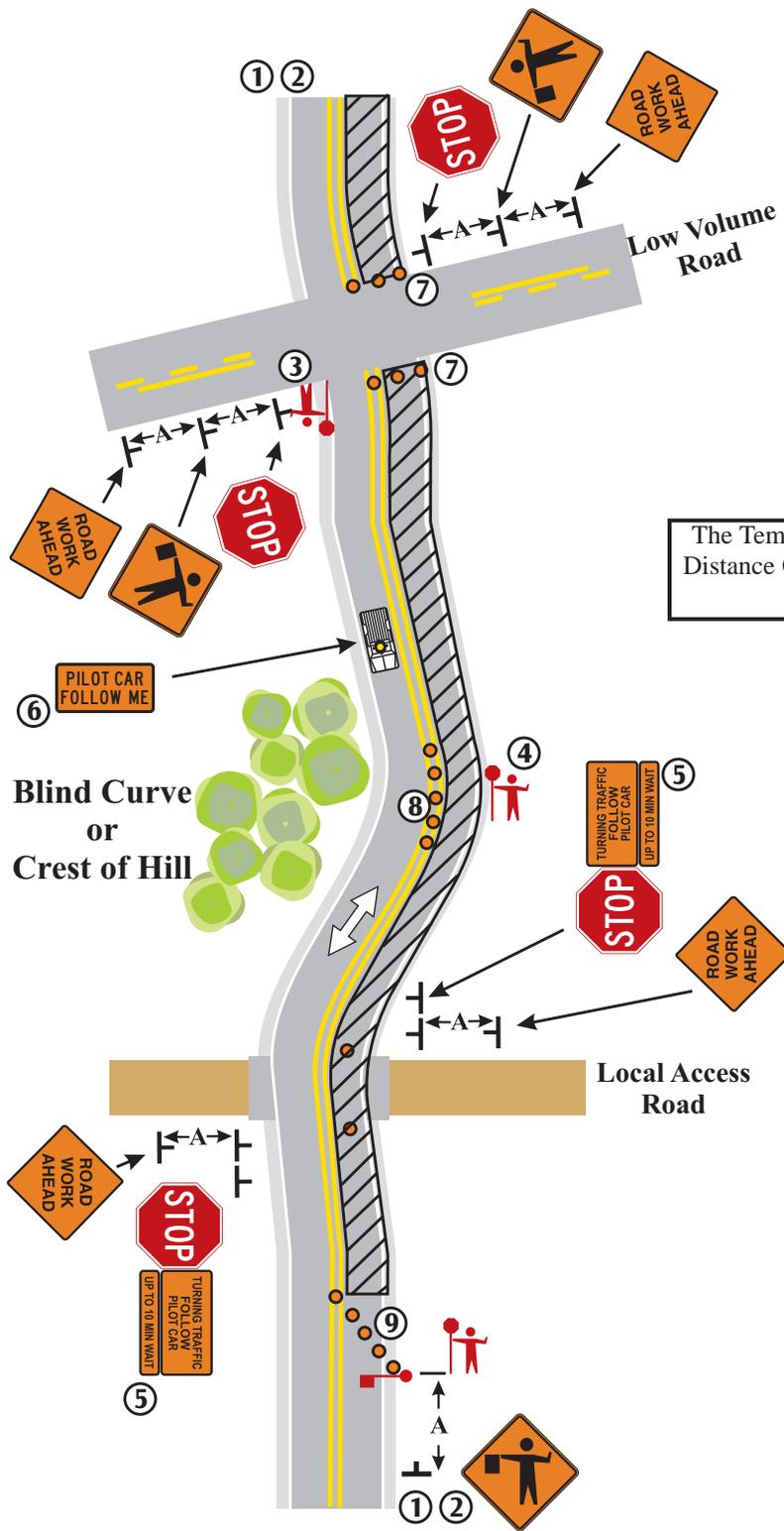
**FLAGGING CROSSROADS AND BLIND CURVES  
PILOT CAR OPERATIONS  
LAYOUT 86a**

3 DAYS or LESS

LAYOUT 86a & b

January, 2014

6K-86a



The Temporary Traffic Control Distance Charts can be found on page 6K-125

**FLAGGING CROSSROAD AND BLIND CURVES  
PILOT CAR OPERATIONS  
LAYOUT 86b**

3 DAYS or LESS

LAYOUT 86a & b

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NOTES:

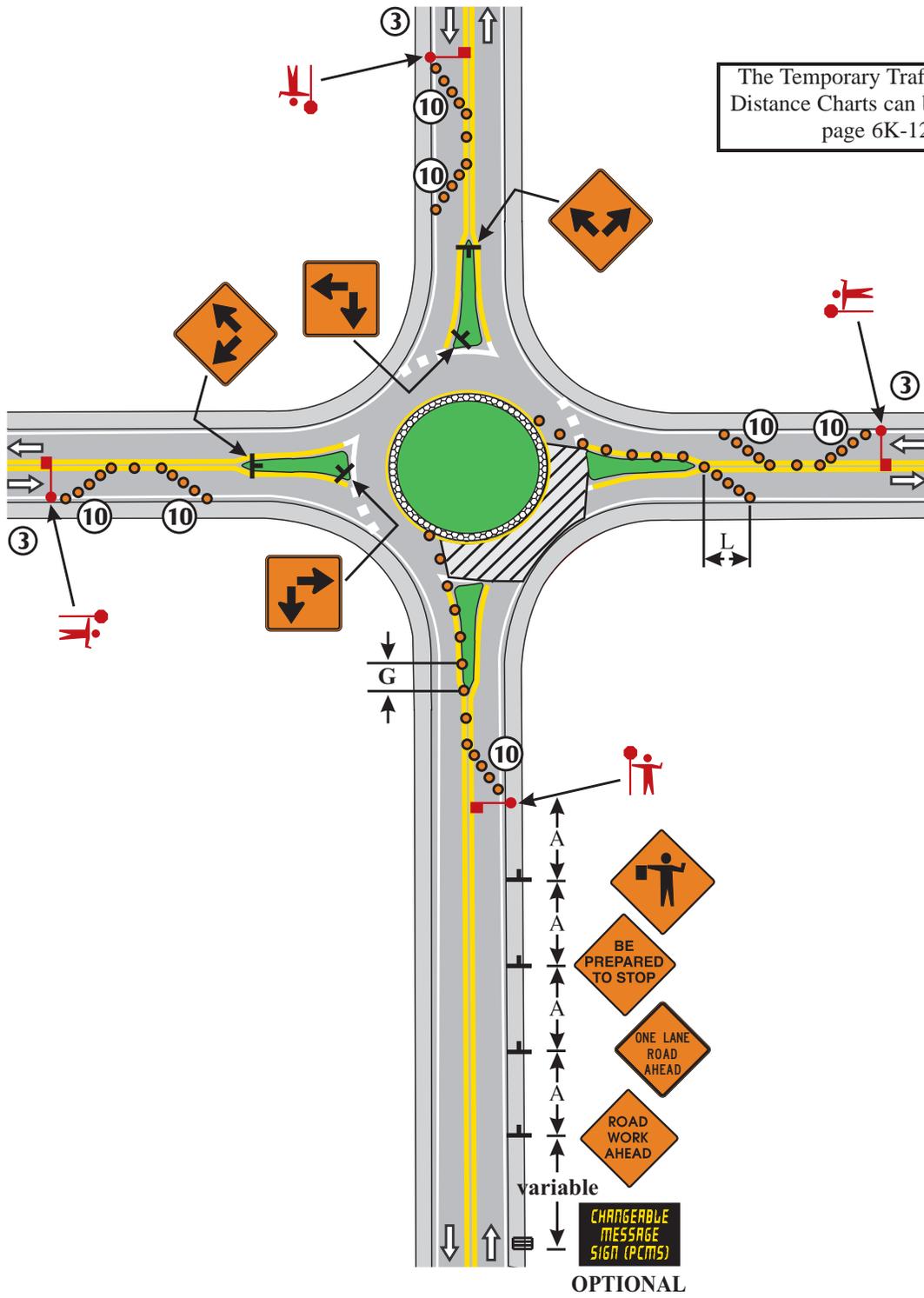
1. Each roundabout is unique and the traffic control shall be developed to meet the specific conditions of the location and the work operation.  
A detour could better serve traffic movement and shall be considered as an alternative to the flagger operation.
2. Flagging operations may not be necessary when working on the shoulders or in the island of the roundabout. If a driving lane(s) width of at least 10 feet (or more) can be maintained while shoulder work on an approach is being conducted, the driving lane(s) may remain open to traffic.
3. Approach signs are the same in all directions.
4. Flaggers shall control traffic flow on all approaches of the one-lane roundabout.
5. A lead flagger shall be designated and radio communication shall be used by the flaggers.
6. Only one approach of traffic shall be released at a time.
7. At night, flagger stations shall be illuminated. Street lights and vehicle headlights shall not be used to illuminate the flagger station.
8. Type B channelizers may be used.
9. A PCMS sign should be considered as part of this operation to provide clear guidance to motorists on all approaches of the roundabout, especially approaches that must reverse traffic flow.
10. The two-way taper should be 50 feet using 5 equally spaced channelizing devices.

**LANE CLOSURE IN ROUNDABOUT  
SINGLE LANE ROUNDABOUT  
LAYOUT 88a**

3 DAYS or LESS

LAYOUT 88a & b

The Temporary Traffic Control Distance Charts can be found on page 6K-125



### LANE CLOSURE IN ROUNDABOUT SINGLE LANE ROUNDABOUT LAYOUT 88b

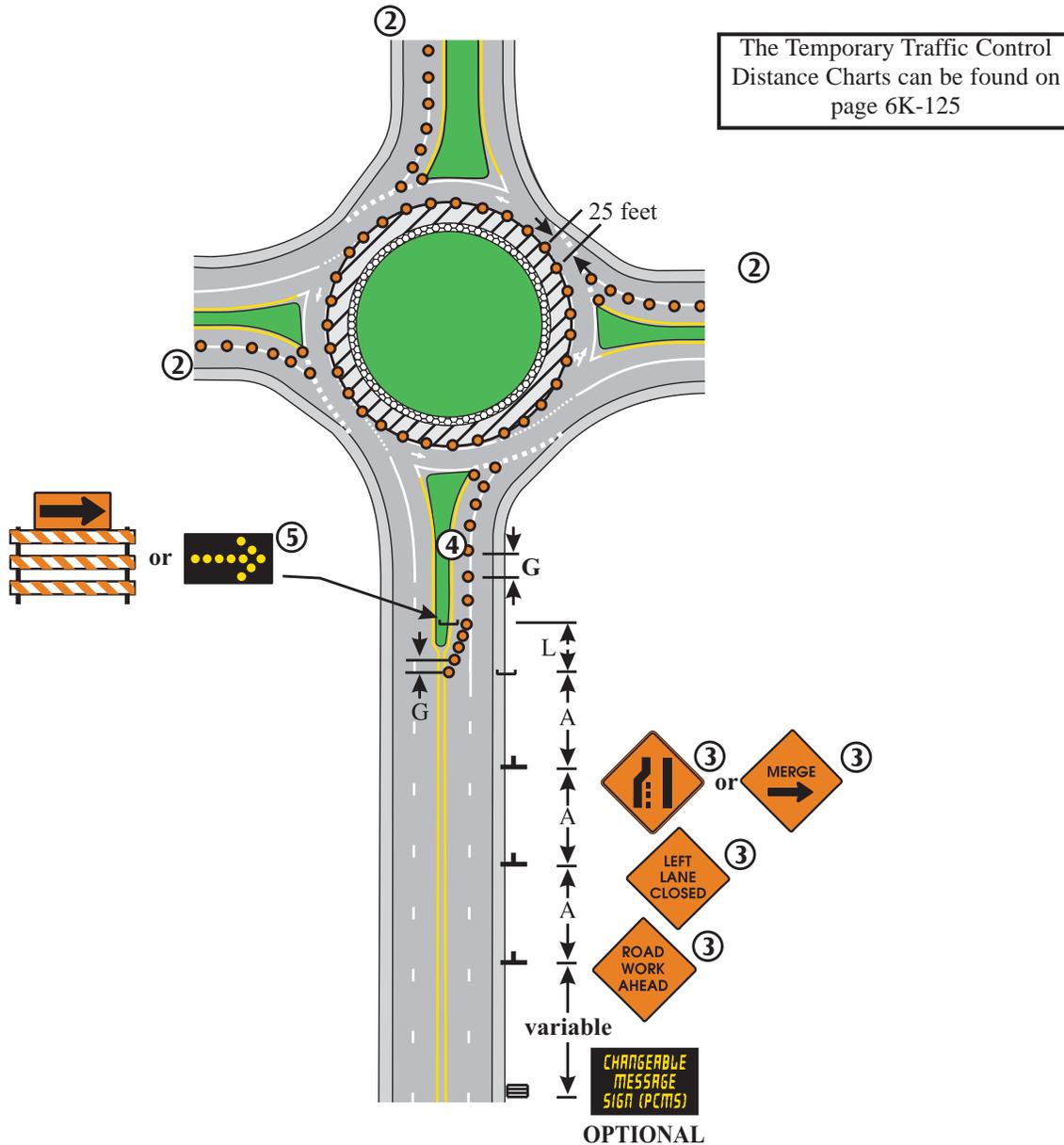
3 DAYS or LESS

LAYOUT 88a & b

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NOTES:

1. Each roundabout is unique and the traffic control shall be developed to meet the specific conditions of the location and the work operation.  
A detour could better serve traffic movement and shall be considered as an alternative to the flagger operation.
2. Approach signs are the same in all directions.
3. On divided highways having a median wider than 8 feet, right and left sign assemblies shall be required.
4. Type B channelizers may be used.
5. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.



**LEFT LANE CLOSURE IN ROUNDABOUT  
TWO LANE ROUNDABOUT**

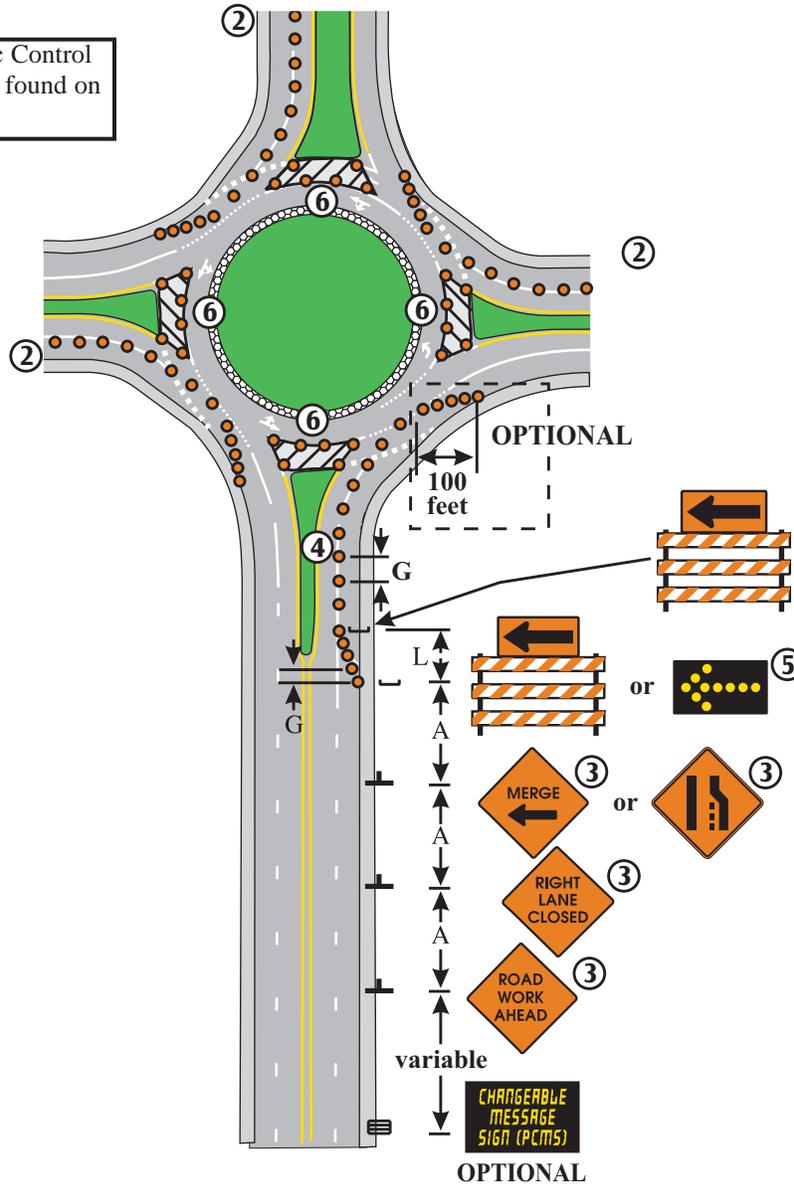
3 DAYS or LESS

LAYOUT 89

NOTES:

1. Each roundabout is unique and the traffic control shall be developed to meet the specific conditions of the location and the work operation.  
A detour could better serve traffic movement and shall be considered as an alternative to the flagger operation.
2. Approach signs and devices are the same in all directions.
3. On divided highways having a median wider than 8 feet, right and left sign assemblies shall be required.
4. Type B channelizers may be used.
5. The flashing arrow board shall be used when the posted speed limit is 45 mph or greater.
6. The distance between channelizing devices should be 10 feet or adjusted for local conditions.

The Temporary Traffic Control Distance Charts can be found on page 6K-125



**RIGHT LANE CLOSURE IN ROUNDABOUT  
TWO LANE ROUNDABOUT**

3 DAYS or LESS

LAYOUT 90



# Quality Standards

Methods to determine whether the various traffic control devices are Acceptable, Marginal, or Unacceptable.

Quality Standards

## Contents

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These Layouts as well as the entire Field Manual, the Flagging Handbook and other documents are available on the Mn/DOT, Traffic Engineering website at:

<http://www.dot.state.mn.us/trafficeng/>

## INTRODUCTION

Traffic controls are a necessary part of a Temporary Traffic Control Zone to warn motorists of hazards, advise them of the proper path through the zone, delineate areas where they may not operate, and to separate them from the workers. This is accomplished by the deployment of a system of devices. The success of this system depends on the visibility of each device at the time of a project's initial installation as well as throughout the life of the project. Since it is not practical to require new devices at all times, standards are needed to evaluate the condition of the devices to assure their continued effectiveness. The standards in this publication should aid in the determination of the quality of temporary traffic control devices.

The use of temporary traffic control zone devices subjects them to wear which does not occur with permanent devices. Although errant vehicles cause much of the damage to the devices, they also deteriorate in appearance from wear occurred during their storage, shipment, installation, relocation, and removal. Whenever a high number of these worn and damaged devices appear on the same project, the general appearance of the Temporary Traffic Control Zone deteriorates, reducing the level of safety provided to the workers, pedestrians, and traveling public.

These standards have been developed in an effort to offset the deterioration in the appearance of Temporary Traffic Control Zone devices. A determination of the condition of device quality should be made at several stages: while in storage, during preparation for delivery to the Temporary Traffic Control Zone, during initial set up and periodically during the course of the work. Suppliers and contractors are encouraged to apply this standard prior to delivery of devices to the jobsite. Doing so will minimize agency involvement and reduce costs related to on-site replacement.

These standards are intended to address the day-to-day operations of traffic control within a Temporary Traffic Control Zone and are not meant to cover the needs of emergency situations.

The Temporary Traffic Control  
Distance Charts can be found on  
page 6K-125

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## QUALITY CLASSIFICATIONS AND REQUIREMENTS

The quality of the Temporary Traffic Control Zone devices in this standard has been divided into three classifications: acceptable, marginal, and unacceptable. Acceptable devices meet the all MN MUTCD requirements such as design, size, color, weight, etc., and are properly placed as specified, and clearly perform their intended function. The term "Marginal" for the purpose of this manual means "marginally acceptable", reaching the lower end of acceptability. Devices that fall into the "unacceptable" classification shall not be delivered to the jobsite.

The required minimum percentage of acceptable devices has been established for each type of device and varies upon the duration of the Temporary Traffic Control Zone.

### Intermediate and Long Term Duration

Within each Temporary Traffic Control Zone that is planned to remain in place for more than twelve (12) hours, the following requirements shall be followed:

- At the time of the initial set up or at the time of major stage changes, one hundred percent (100%) of each type of device (channelizers, barricades, signs, warning lights, arrow panels portable changeable message signs, pavement tape and raised pavement markers) shall be classified as "acceptable".
- Throughout the duration of the project, the number of acceptable devices may decrease to seventy-five percent (75%) of the initial quantity of each particular device, as a result of damage and/or deterioration during the course of the work with the remainder of the devices in the "marginal" category.
- Devices in the marginal category may remain in the Temporary Traffic Control Zone until their total number exceeds the twenty-five percent (25%) maximum for that type of device, which is considered an "unacceptable" situation. Should the percentage of devices in the marginal category exceed twenty-five percent (25%), all marginal devices shall be replaced so as to bring the group of devices back up to acceptable standards.
- All devices categorized as unacceptable shall be replaced within twelve (12) hours of notification.
- Missing or knocked down devices should be replaced or re-set in a timely manner.

## **Short Term Duration**

Within Temporary Traffic Control Zones that are planned to be in place for less than twelve (12) hours, the following requirements may be followed:

- At the time of the initial set up, one hundred percent (100%) of all TTC devices except channelizing devices and barricades shall be classified as "acceptable". During the short term duration of the project, the intermediate and long term duration standards shall be maintained for these devices.
- At the time of the initial set up, a minimum of seventy-five percent (75%) of each type of channelizer and barricade shall be classified as "acceptable". Up to a maximum of twenty-five percent (25%) of these devices may be classified as "marginal". "Unacceptable" devices shall not be installed.
- During the short term duration of the project, the number of marginal devices may increase beyond the twenty-five percent (25%) of the initial quantity, as a result of damage and/or deterioration during the course of the work.
- Missing or knocked down devices should be replaced or re-set in a timely manner.

The following descriptions, together with the accompanying photographs, should be used to determine if the device is acceptable, marginal or unacceptable.

## EVALUATION GUIDE: WARNING SIGNS

### Acceptable

To be considered acceptable, a sign shall meet all of the following conditions:

- There may be several abrasions on the surface, but very little loss of lettering.
- There has been no touchup of the lettering.
- This message is legible both day and night.
- Signs on portable structures shall be longitudinally perpendicular to the ground and may be placed on a side slope resulting in 3 inches maximum out-of-plumb per foot of height.
- Post mounted signs shall be installed within 3 inches of plumb for the height of the posts.
- The back side is free of any reflective materials except small logos or identification markings and have a bare surface or be painted a uniform color as approved by the local road authority.
- The sign is in place at the specified spacing and properly aligned to traffic.
- The sign support structure has been installed according to the approved crashworthy requirements.

Examples of "Acceptable" warning signs



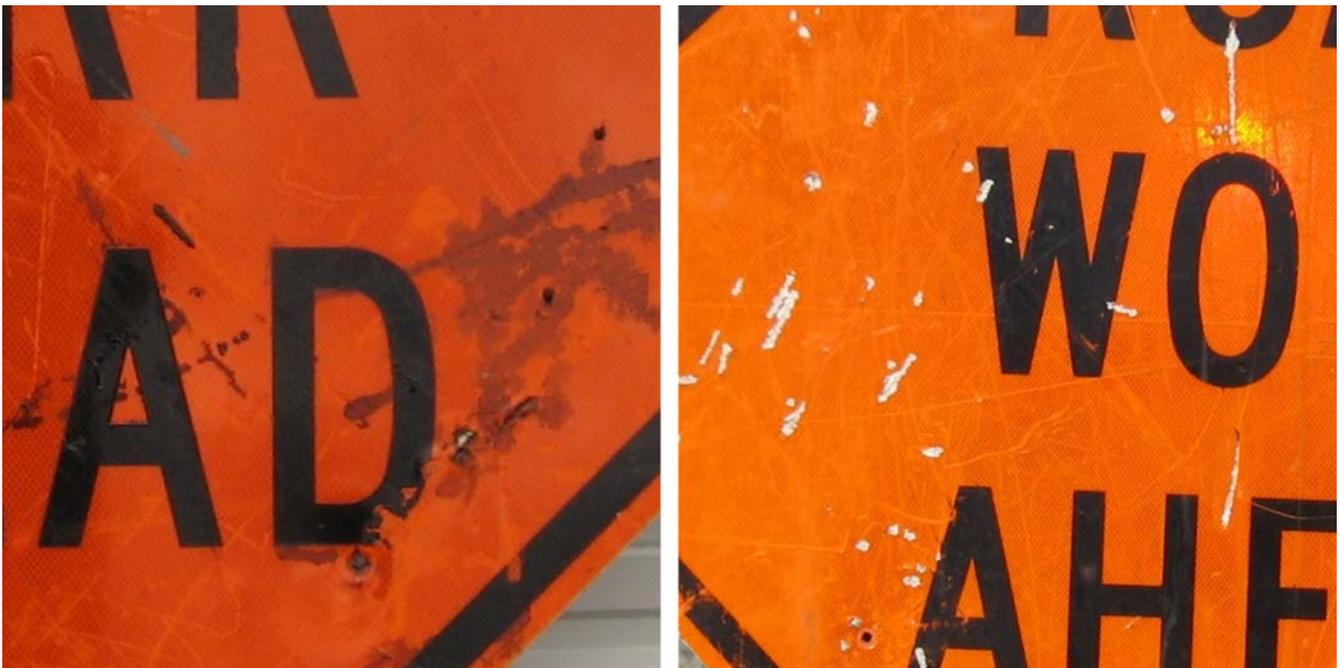
## EVALUATION GUIDE: WARNING SIGNS

### Marginal

The sign is considered marginal, if it meets any of the following conditions:

- There are many surface abrasions throughout the sign face, and only a few are within the individual letters of the message.
- The sign face is free of any residue.
- Some color fading may be evident, but the background color and retroreflectivity are still apparent at night.
- This message is legible both day and night.
- Signs on portable structures are longitudinally perpendicular to the ground and the side slope results is no more than 3 inches out-of-plumb per foot of height.
- Post mounted signs shall be within 3 inches of plumb for the height of the posts.
- All warning signs are in place at the specified spacing and properly aligned to traffic.

Examples of "Marginal" warning signs



## EVALUATION GUIDE: WARNING SIGNS

### Unacceptable

A sign is considered unacceptable if it meets any of the following conditions:

- Asphalt splatter, cement slurry, other residue, or abrasions that are evident throughout the face of this sign.
- Portions of letters are missing such that they become confusing to identify.
- The message is illegible.
- There is noticeable color fading or loss of retroreflectivity at night.
- The sign face is not perpendicular to the roadway.
- iPost-mounted signs are installed more than 3 inches out-of-plumb for the entire height of the assembly.
- Signs on portable structures are more than 3 inches out-of-plumb for the entire height of the assembly.
- Signs are damaged or defaced in a way that they no longer have the same shape as a new sign.

Examples of "Unacceptable" warning signs



## EVALUATION GUIDE: TYPE A & B CHANNELIZING DEVICES

### Acceptable

To be considered acceptable, a channelizing device shall meet all of the following conditions:

- The devices' shape should remain clearly identifiable with no significant distortion and must be free standing in its normal position.
- Surface is free of punctures and abrasions.
- Surface is free of asphalt splatter, cement slurry, or other material and will readily respond to washing.
- The reflective bands have little or no loss of retroreflectivity, with only minor tears and scratches.
- Any dents do not seriously reduce the retroreflectivity of the sheeting
- Any dents do not seriously reduce the retroreflectivity of the sheeting



### Marginal

The channelizing device is considered marginal, if it meets any of the following conditions:

- The surface has some asphalt splattering or cement slurry and may not be readily cleaned due to abrasions and discoloration.
- The reflective bands have numerous tears and scratches; but have no large areas of residue or missing reflective material.
- Any dents do not reduce the strength of the device.
- The device maintains its intended shape.
- No more than one device in a row is missing.



## EVALUATION GUIDE: TYPE A & B CHANNELIZING DEVICES

### Unacceptable

A channelizing device is considered unacceptable if it meets any of the following conditions:

- Punctures and large areas of staining asphalt splatter or cement slurry that cannot be cleaned due to abrasions or discoloration.
- There is noticeable fading of the device's color.
- Large areas of missing or stained reflective material.
- Substantial deformation of a device, which reduces the original dimensions, or the device has lost the intended shape.
- Several dents or fractures that affect their stability or ability to retain the reflective sheeting.
- Two or more consecutive devices are missing.



## EVALUATION GUIDE: TYPE I, II OR III BARRICADE PANELS OR VERTICAL PANELS

### Acceptable

To be acceptable, the panel shall meet all of the following conditions:

- Panels are not deformed to an extent so as to decrease the panels target value.
- There may be several abrasions on the surface but very little loss of reflective sheeting.
- The orange is vivid and the stripes provide contrast.
- The barricade is installed in its specified location with adequate ballast, and properly aligned to traffic.
- The Type III barricade has been fabricated according to the approved crashworthy requirements.



### Marginal

The panel is considered marginal, if it meets any of the following conditions:

- There are numerous surface abrasions through the panel surface.
- Some color fading is evident; however, it has no large areas of residue or missing reflective material.
- The orange is vivid and the stripes provide contrast.
- The barricade is turned at a skew to traffic that reduces it's effectiveness.



### Unacceptable

A panel is considered unacceptable if it meets any of the following conditions:

- The surface is marred over a high percentage of the panel area.
- There is a noticeable loss of reflectivity and obvious color fading.
- Panels with asphalt splatter and/or cement slurry, or any combination of missing and covered reflective material would make the panel unacceptable.
- Barricades have bent or twisted legs, or deformation of the support assembly to the extent that the barricade panel is not reasonably parallel to the roadway surface.
- The barricade is missing, knocked down, or turned away from traffic.



## EVALUATION GUIDE: WARNING LIGHTS

### Acceptable

To be acceptable, the warning lights shall meet all of the following conditions:

- One hundred percent (100%) of all warning lights shall be operating properly. Any warning light that is out of alignment from the intended driver's line of vision is considered not operating properly.
- Type A Low-Intensity Flashing warning lights and Type C Steady-Burn warning lights shall be maintained so as to be capable of being visible on a clear night from a distance of 3000 feet.
- Type B High-Intensity Flashing warning lights shall be maintained so as to be capable of being visible on a sunny day when viewed without the sun directly on or behind the device from a distance of 1000 feet.
- Warning lights shall have a minimum mounting height of 30 inches to the bottom of the lens.

### Marginal

The warning light is marginal, when it meets any of the following conditions:

- Type A and C warning lights - at least ninety percent (90%) of the warning lights shall be operating properly with no more than three (3) adjacent lights failing, or
- Type B warning lights - one (1) light failing.

### Unacceptable

A warning light is considered unacceptable if it meets any of the following conditions:

- Type A and C warning lights - less than ninety percent (90%) of the warning lights operating properly, or more than three (3) adjacent lights failing, or
- Type B warning lights - more than one (1) light failing.

## EVALUATION GUIDE: ARROW BOARDS

### Acceptable conditions for all arrow boards

For an arrow board to be acceptable, it must meet all of the following conditions:

- All lamps are properly aligned for the intended driver's line of vision. Any operating lamp which is out of alignment shall be considered not functioning properly.
- No lamps are burnt out.
- All lamps dim properly.
- All lamps are the same level of intensity.

### Unacceptable conditions only for truck or trailer-mounted arrow boards

An arrow board is considered unacceptable if it meets any of the following conditions:

- The arrow board is not within 3 inches of plumb for the height of the board,
- The trailer-mounted arrow board is not raised to at least 7 feet above the roadway surface (measured to the bottom of the board), or
- The truck-mounted arrow panel is mounted less than 6 feet above the roadway surface (measured to the bottom of the panel) unless the road authority determines the height is as high as practical..

### ***FLASHING ARROW MODE and SEQUENTIAL ARROW MODE***



### Marginal

An arrow board in this mode is marginal, when it meets the following condition:

- Up to two (2) lamps out in the stem and no lamps out in the head.

### Unacceptable

An arrow board in this mode is considered unacceptable if it meets any of the following conditions:

- Any lamp out in the head,
- More than two (2) lamps out in the stem, or
- The arrow message is not visible at 1000 feet.

## EVALUATION GUIDE: ARROW BOARDS

### ***CHEVRON MODE***



#### **Marginal**

An arrow board in this mode is marginal, when it meets the following condition:

- No more than one (1) lamp out in any one chevron segment.

#### **Unacceptable**

An arrow board in this mode is considered unacceptable if it meets any of the following conditions:

- Two (2) or more lamps out in any one chevron
- The arrow message is not visible at 1000 feet.

### ***CAUTION MODE (Bar, 4 Corners, or Alternating Diamonds)***



#### **Marginal**

An arrow board in this mode is marginal, when it meets the following condition:

- At least four (4) lamps functioning properly (on the Bar or 4 Corners), or
- At least seven (7) lamps functioning properly in each diamond shape (on the Alternating Diamonds).

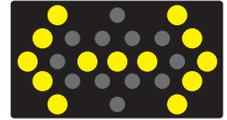
#### **Unacceptable**

An arrow board in this mode is considered unacceptable if it meets any of the following conditions:

- Less than four (4) lamps functioning properly (on the Bar or 4 Corners), or less than seven (7) lamps functioning properly in either of the 2 diamond shapes (on the Alternating Diamonds), or
- The arrow message is not visible at 1000 feet.

## EVALUATION GUIDE: ARROW BOARDS

### ***DOUBLE ARROW MODE***



#### **Marginal**

An arrow board in this mode is marginal, when it meets the following condition:

- Two (2) lamps out in the stem and both heads completely functional with no lamps out.

#### **Unacceptable**

An arrow board in this mode is considered unacceptable if it meets any of the following conditions:

- More than two (2) lamps out in the stem,
- One (1) lamp out in the head, or
- The arrow message is not visible at 1000 feet.

## **EVALUATION GUIDE: PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)**

### **Acceptable**

To be acceptable, a PCMS shall meet the following condition:

- One hundred percent (100%) of the pixels per character module shall be operating properly.

### **Marginal**

A PCMS is marginal, when it meets the following condition:

- At least ninety percent (90%) of the pixels per character module shall be operating properly.

### **Unacceptable for all PCMSs**

A PCMS is considered unacceptable if it meets any of the following conditions:

- Less than ninety percent (90%) of the pixels per character module are operating properly, or.
- The PCMS is not properly aligned for the intended driver's line of vision.

### **Unacceptable for Trailer-Mounted PCMS**

A trailer-mounted PCMS is considered unacceptable if it meets any of the following conditions:

- The sign panel is more than 3 inches out of plumb, or
- The sign panel is raised less than 5 feet above the roadway surface on rural roadways or less than 7 feet on urban toadways (measured to the bottom of the board).

## **EVALUATION GUIDE: TRAILER-MOUNTED ELECTRONIC TRAFFIC CONTROL DEVICES**

This includes devices such as Automated Flag Assistance Devices (AFADs), Portable Traffic Signals, and Dynamic Speed Display Signs:

### **Acceptable**

For an electronic traffic control device to be acceptable, shall meet the following conditions:

- The device shall be operating correctly for its intended usage within allowable tolerances and with all fail-safes properly functioning.
- All lamps, LED displays and signs are properly aligned for the intended driver's line of vision. Any operating lamp, LED display or sign which is out of alignment shall be considered not functioning properly.
- One hundred percent (100%) of the LED pixels per character module are operating properly.
- One hundred percent (100%) of the lamps are operational..
- All lamps and LED displays dim properly.
- The signs meet or exceed the quality standards for acceptable "Warning Signs".
- The device's leveling stands shall be adjusted to properly plumb the device.
- The bottom of any overhead signal head shall be between 17 and 19 feet above the roadway surface.

### **Marginal**

An electronic traffic control device when it meets any of the following conditions:

- At least ninety percent (90%) of the LED pixels per character module are operating properly.
- The signs meet the quality standards for marginal "Warning Signs".

### **Unacceptable**

An electronic traffic control device is considered unacceptable if it meets any of the following conditions:

- The device is malfunctioning for any of its intended functions including but not limited to signal operations, radio communications, detection, or message display,
- Any of the lamps are burned out,
- Less than ninety percent (90%) of the LED pixels per character module are operating properly,
- The device is not properly aligned for the intended driver's line of vision,
- The lamps and LED displays are not dimming properly,
- The device is not within 3 inches of plumb for the height of the device (excluding an overhead signal head mast), or
- The bottom of any overhead signal head is lower than 17 feet or higher than 19 feet above the roadway surface.

# MINNESOTA FLAGGING HANDBOOK



January, 2014

Quality  
Standards

This Flagger Handbook has been developed following the guidelines of the 2005 edition of the Minnesota Manual on Uniform Traffic Control Devices, including its latest update.

According to Minnesota Statute 169.06, Subd. 4(e), a flagger is permitted to stop and hold traffic as necessary to ensure the safety of highway workers and the motoring public.

These Layouts as well as the entire Field Manual, the Flagging Handbook and other documents are available on the Mn/DOT, Traffic Engineering website at:

<http://www.dot.state.mn.us/trafficeng/>

## INTRODUCTION

### To You, the Flagger:

**REMEMBER** - Your job is the most important one on the crew. The lives of all individuals in the work space depend on YOU!

The following information is designed to give you some basic guidelines regarding flagging operations. Familiarize yourself with these procedures. If you have any questions or concerns, don't hesitate to ask your supervisor.

For your personal safety as a flagger **NEVER** turn your back on or stand in the path of moving traffic.

## EQUIPMENT

### Clothing

All clothing shall be in accordance with current Minnesota OSHA Rules and your agency's policies.

- Vest, shirt, or jacket and pants (when required) shall be orange, yellow, strong yellow-green or a fluorescent version of these colors.
- At night and in low visibility situations, the vest, shirt or jacket and pants shall be retro-reflective.
- Pants shall be worn at night and in low visibility situations.
- A hat in the above colors is also recommended.
- Neat appearance

### Retroreflective clothing

Retroreflective clothing shall:

- Be visible at a minimum distance of 1000 feet.
- Identify the wearer as a person through the full range of body motions.

### Tools

- Standard STOP/SLOW paddle
  - 18 x 18 inch minimum octagon
  - 5 foot minimum staff (to the bottom of the sign). 7 foot is recommended
  - Fully reflectorized in standard colors
- Two-way radios for two flagger situations
- Floodlights and Flashlight with wand, if flagging at night.

## FLAGGING POSITION

- Be alert, remain standing at all times
- **Face oncoming traffic - NEVER turn your back to oncoming traffic** or stand in the path of moving traffic. See Figure 1.
- **A flagger's normal station is on the shoulder of the road.**
- Park your vehicle off the road, away from your station.
- Stand alone, do not mingle with the work crew or the public.
- Make sure you are visible to oncoming traffic, not standing where the sun is impeding visibility or in a shadow.
- Stand in a location that allows approaching traffic adequate time to respond. Use the Decision Sight Distance in the following chart to determine a good visibility location. The driver must be able to recognize you as a flagger for at least the Decision Sight Distance.

## Decision Sight Distance

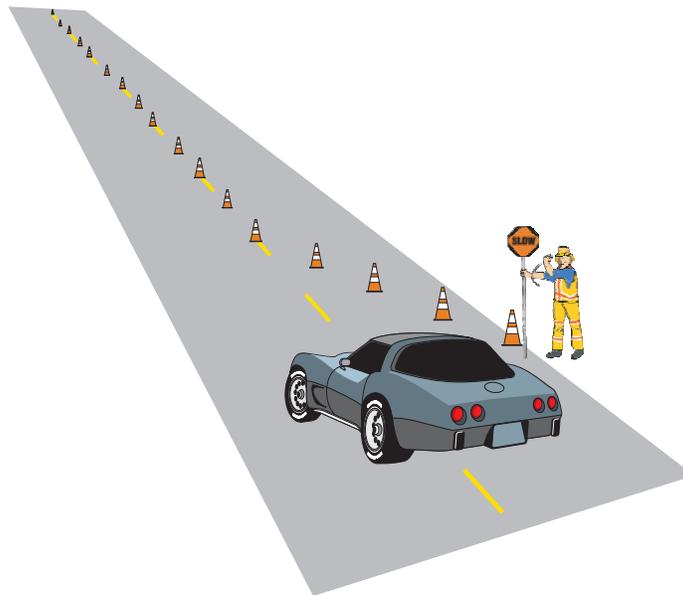
Posted Speed (mph)	Decision Sight Distance (feet)
0 - 30	550
35 - 40	700
45 - 50	900
55	1200
60 - 65	1400
70 - 75	1600

### FLAGGING SITUATIONS

Prior to the start of flagging operations, all signing shall be in place. A good visibility location is one where the sight distance is sufficient and the flagger is clearly visible to approaching motorists.

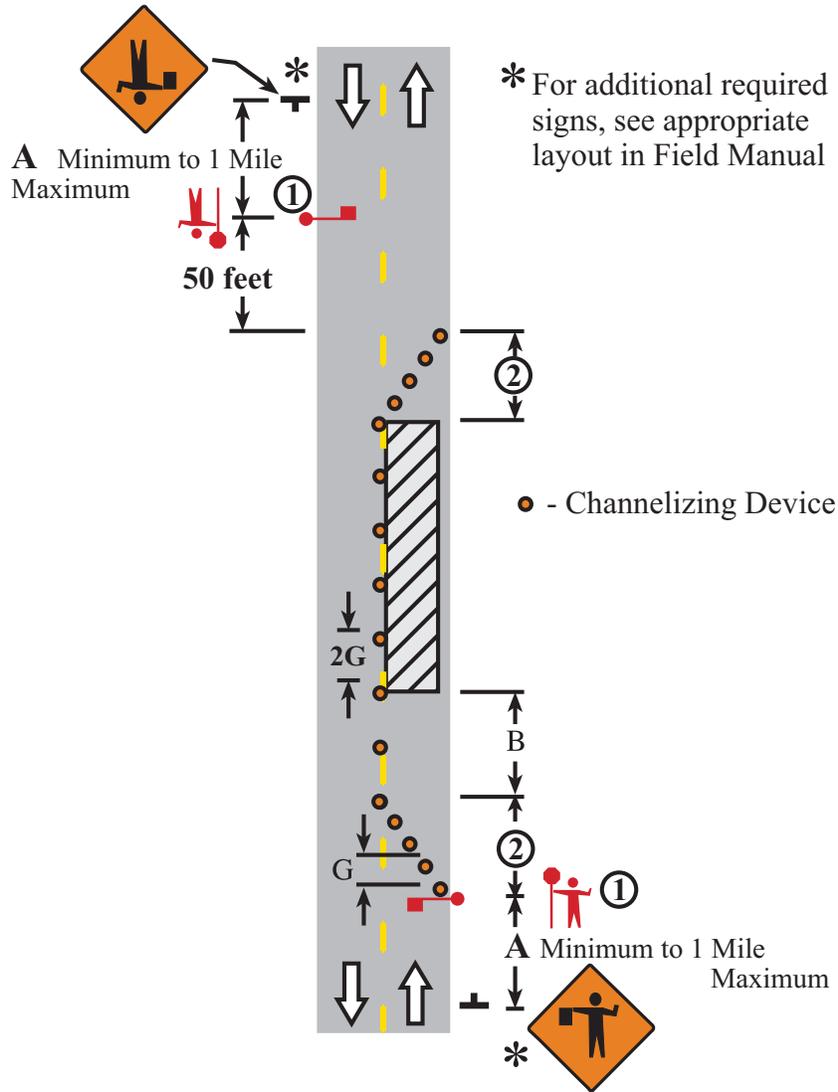
When the temporary traffic control zone covers a long segment of highway, additional flagger signs may be needed. In high speed areas, the maximum distance from the last sign to a point where the driver detects the flagger shall not exceed 1 mile.

When more than one flagger is being used, all communication procedures should be clear before any flagging begins. If there is a major intersection within the closed area, an additional flagger may be needed to control traffic entering the temporary traffic control zone from the major intersection.



*Figure 1  
Preferred Flagging Position*

Posted Speed Limit Prior to Work Starting (mph)	Advance Warning Sign Spacing (feet) (A)	Channelizing Device Spacing (feet) (G)	Buffer Space (feet) (B)	Decision Sight Distance (feet) (D)
0 - 30	250	25	200	550
35 - 40	325	25	305	700
45 - 50	600	50	425	900
55	750	50	500	1200
60 - 65	1000	50	650	1400
70 - 75	1200	50	820	1600



NOTES:

1. The approach sight distance to the flagger shall be at least the Decision Sight Distance.
2. The two-way taper should be 50 feet using 5 equally spaced channelizing devices.

Figure 2  
 Flagger Location for a Lane Closure

Traffic backing up over long distances due to flagging operations may cause potentially dangerous situations. These situations may include traffic backing up through an intersection, up an exit ramp onto the freeway, or stopping prior to the first warning signs. When the flagger observes this type of situation occurring, they should notify their immediate supervisor. To reduce traffic backups, the flagger may be given instructions on how to help maintain a shorter backup of vehicles.

### Single Flagger

There are two different applications of the single flagger situation.

1. On an intermediate volume road (less than 1500 ADT) with good visibility, a single flagger may be used to control one direction of traffic while the other direction flows free. In this situation, the flagger is positioned in the closed lane at the beginning of the taper. The flagger stops the traffic approaching in the closed lane. When the open lane is clear, the flagger allows traffic to proceed. If the Decision Sight Distance is not available beyond the work space for the flagger to detect oncoming traffic, two flaggers shall be used. Two flaggers may also be required during high peak traffic periods or if there is a major intersection near the activity area.
2. A single flagger may also be used to stop traffic in a lane while that lane is closed. An example would be a truck depositing material off the edge of the roadway. In this situation, the flagger would stop the traffic in this lane while the other lane flows free. When the lane is open again, the flagger allows the traffic to proceed in their normal lane. After stopped traffic is allowed to proceed, the flagger should turn the flagger paddle parallel to traffic so that no message is displayed to either direction of traffic.

### Two Flaggers

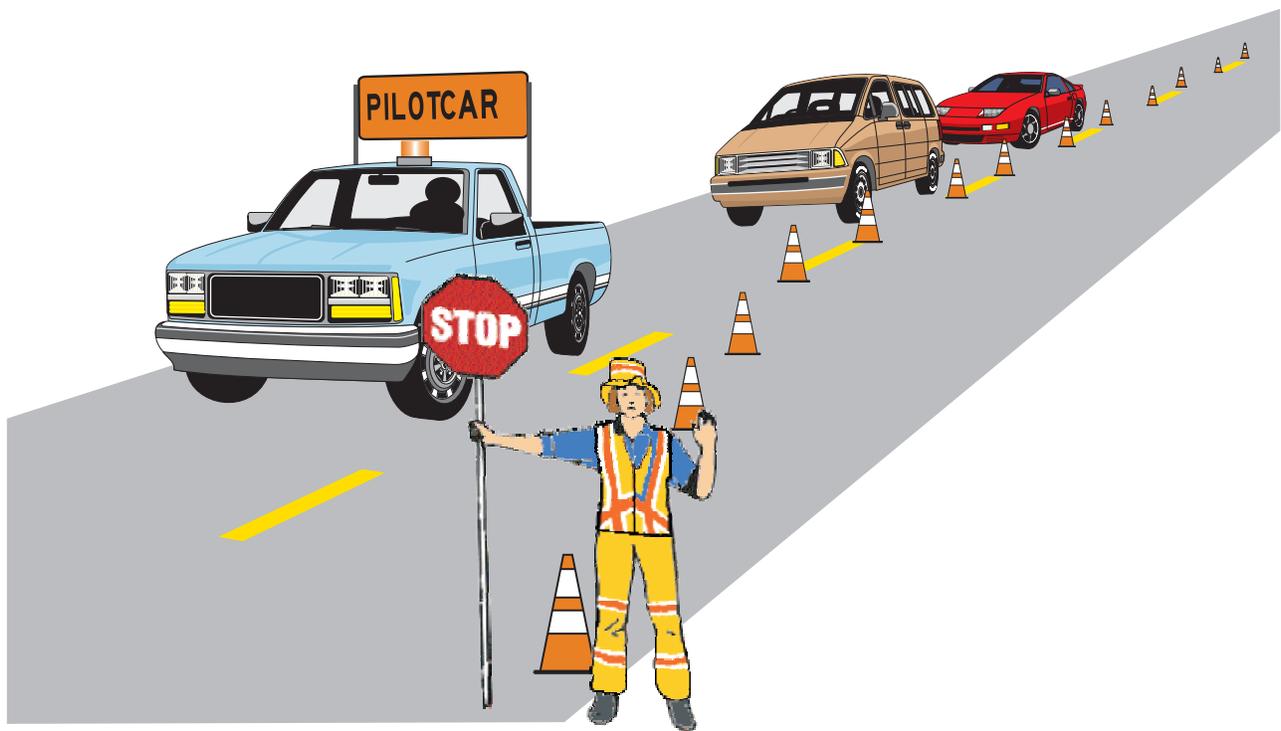
When two flaggers are required, lines of communication must be established prior to the start of flagging operations. The two flaggers must be able to see each other or have two-way radios designated for proper communication. One flagger should be the lead flagger and coordinate all activities.



Figure 3  
Two Flagger Operation

When two flaggers are used and two-way radios are unavailable, the flag transfer method may be used. The driver of the last vehicle proceeding into the one lane section is given a flag (or other token object) and instructed to deliver it to the flagger at the other end. The opposite flagger then knows that it is safe to allow traffic to move in the other direction. The flag (or token object) being carried should always be clean and dry.

Two flaggers may also be used in conjunction with a pilot car. In this situation, the flagger stops the traffic until the pilot car arrives and has pulled into position to lead the traffic through or around the activity area. The flagger then releases traffic to follow the pilot. When a large gap in traffic or a pre-determined length of time occurs, as instructed by the supervisor, traffic is stopped. During pilot car operations, traffic should follow the pilot car and remain in a tight group to prevent traffic from separating along the route. To help keep the traffic group tight, flaggers should not allow additional cars to follow the group if last car in the group has proceeded more than 300 feet from the flagging location. The flagger shall then stop and hold all traffic until the pilot car has returned for the next trip.



*Figure 4*  
*Use of a Pilot Vehicle*

### **Advance Flagger**

An advance flagger may be used where there is limited sight distance to the activity area or where long lines of traffic form. In a situation such as limited sight distance, the advance flagger should stop each vehicle and inform the driver of the situation ahead. Where there are long lines of stopped traffic waiting to proceed, the advance flagger should move down the line and inform each driver of the reason for the delay and the approximate length of the delay.

## **FLAGGING PROCEDURES**

### **To Stop Traffic**

Stand on the shoulder of the road, away from moving traffic. Face traffic and extend the STOP paddle in a stationary position with the arm extended horizontally away from the body. The free arm should be raised with the palm toward approaching traffic. Look directly at the approaching driver. Make sure that you make direct eye contact with this driver!

Remain on the shoulder of the road after the first vehicle has stopped. Always make certain that the flagger and the paddle are visible to the drivers of all stopped vehicles. The flagger should never stand in the traffic lane unless, in the flagger's opinion, the drivers of the stopped vehicles are unaware of the flagger's presence. If it is necessary for the flagger to stand in the traffic lane, the flagger may only stand near the centerline and never cross it. When the flagger is satisfied that the drivers of all stopped vehicles are aware of his/her presence, the flagger should return to the shoulder of the road.

NOTE: Anytime the flagger is required to take a position near the centerline of the traffic lane, the flagger should remain aware of the traffic traveling in the opposite direction.

### **To Direct Stopped Traffic to Proceed**

Remain at the flagger station on the shoulder. If the flagger is in the stopped traffic lane, return to the shoulder. Face traffic and turn the SLOW paddle to face traffic. Hold the SLOW paddle in a stationary position with the arm extended horizontally away from the body. The flagger may motion with the free hand for traffic to proceed. Do not wave the paddle.

### **To Alert or Slow Traffic**

Stand on the shoulder of the road and face traffic with the SLOW sign paddle held in a stationary position with the arm extended horizontally away from the body. The flagger may motion up and down with the free hand, palm down, indicating that the vehicle should slow down. Never stand in the path of oncoming traffic.

## **AUTOMATED FLAGGING DEVICES**

Automated Flagging Assistance Devices (AFADs) enable the operator to be positioned out of the lane of traffic and are used to control road users through temporary, one-lane, two-way traffic control zones. These devices are capable of displaying a STOP message followed by a SLOW message without the need for a flagger in the immediate vicinity of the sign or on the roadway. They can be remotely operated by a one operator at a central location or by separate operators near each device location. A single operator may only be used on roadways with unobstructed sight lines, less than 1500 ADT, and less than 1000 feet between the devices.

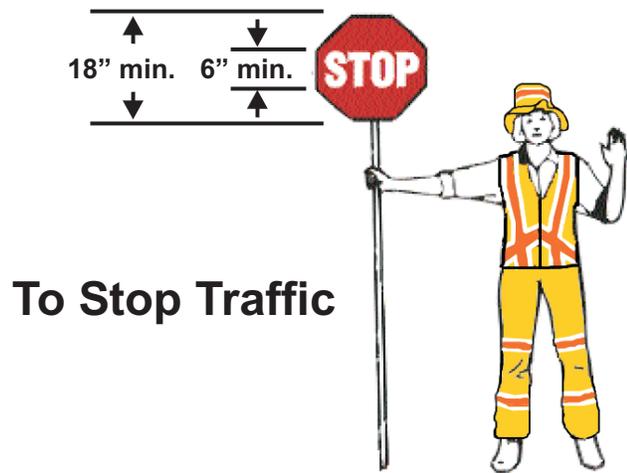
## **NIGHTTIME FLAGGING**

At night, flagger stations should be well illuminated. The flagger shall wear retroreflective pants, and vest, shirt or jacket. Reflective channelizing devices shall be used.

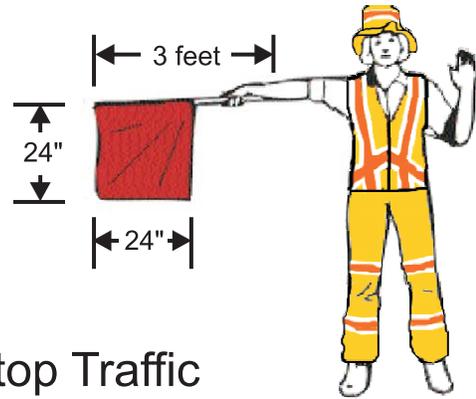
## **EMERGENCY SITUATIONS**

In emergency situations a minimum size 24 x 24 inch red flag may be used in lieu of a paddle until a paddle is available. However, as soon as a STOP/SLOW paddle is available it shall be used.

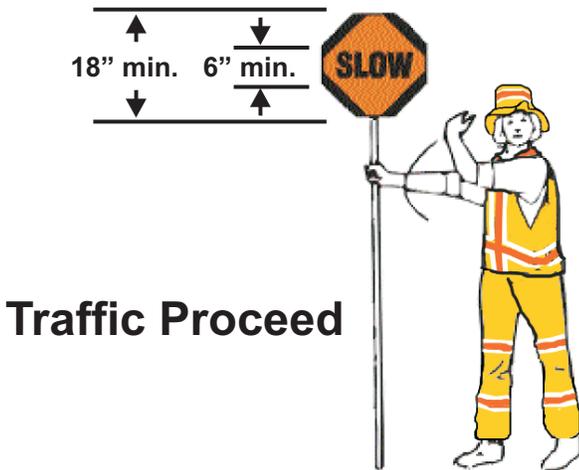
## The Use of Hand Signalling Devices by a Flagger



To Stop Traffic



To Stop Traffic



Traffic Proceed



Traffic Proceed



To Alert and Slow Traffic



To Alert and Slow Traffic

*Figure 5  
Preferred Flagging Method  
Using a Paddle.*

*Figure 6  
Alternate Flagging Method  
Using a Flag.*

## **FLAGGING AT INTERSECTIONS**

A flagging operation within a non-signalized intersection may override STOP and YIELD signs in the intersection. When traffic signals are set to flash red for all approaches, or turned off and temporary STOP signs are installed, the intersection may be treated as a non-signalized intersection. Only a licensed uniformed law enforcement officer may override a fully operating traffic control signal system.

When flagging in an intersection, consider the following:

- The flagger should use hand signals with a flag or light wand to control traffic movements rather than the typical STOP/SLOW paddle.
- The flagger may direct vehicles to proceed through a STOP sign controlled condition while holding traffic on other approaches. Although the flagger may urge motorists to continue through the STOP, the flagger has no authority to prevent traffic from stopping and must allow for this stopping within the operation.
- The flagger should be aware of traffic conditions at adjacent intersections and should coordinate their operations to minimize traffic backups.
- High-volume intersections, large intersections, or complicated situations may require additional flaggers. The flaggers shall coordinate their flagging operations to eliminate conflicts.

## **PROPER CONDUCT**

- Do not abandon your post for any reason until the work is finished or a replacement flagger arrives.
- Do not engage in extended conversations with motorists or lean on vehicles. Be polite, but brief.
- Do not argue with a motorist. Be courteous.
- If a driver refuses to obey instructions, record a description of the car, driver, license plate and the circumstances. Report this information to your supervisor as soon as possible.
- Remove or cover all signs indicating the presence of a flagger, when a flagger is not actually flagging. This includes lunch and breaks.
- Be alert for emergency vehicles. They have "priority rights". Allow them to pass as quickly as possible.

## **NOTES TO THE SUPERVISOR**

- All flaggers should be properly instructed prior to the start of work. Training or certification of flaggers is recommended.
- The importance of the job should be impressed upon the flagger. They are responsible for all workers safety.
- Arrange for the flagger to have rest breaks.
- Drive through the temporary traffic control zone after all signs, devices and the flagger are in place. Check the visibility of the signs, flagger and the activity area.

Refer to Sections 6C and Section 6E of the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) for further information on flaggers and flagging procedures.

# CHECKLIST FOR FLAGGER TRAINING

Contractor: \_\_\_\_\_

Name of MnDOT Qualified Trainer: \_\_\_\_\_

Qualification #: \_\_\_\_\_

- Remember your job is the most important one on the crew. The lives of all individuals in the work space depend on YOU!

The Temporary Traffic Control Distance Charts can be found on page 6K-125

- For your personal safety as a flagger NEVER turn your back on or stand in the path of moving traffic.

- Clothing

- Any flagger on a MnDOT project shall be attired with high visibility, retro-reflective vests, pants and cap that are in accordance with current high visibility apparel contracts approved by MnDOT's safety director.

- Tools

- Standard STOP/SLOW paddle (in good condition) shall be used unless it is not available in an emergency situation
  - 18" x 18" minimum octagon with letters at least 6 inches high
  - 5 foot minimum staff (to bottom of the sign) 7 foot is recommended
  - Fully retroreflective in standard colors
- Illuminated flagger station and flashlights with wand if flagging at night
- Two-way radios for multiple flagger situations
- Warning signs posted in proper position ahead of the flagger

**Continued on next page.**

- Flagging position on the road way:
  - Be alert, remain **STANDING** at all times
  - Face oncoming traffic **NEVER** turn your back to oncoming traffic or stand in the path of moving traffic
  - A flagger's normal station is on the shoulder of the road
  - Park your vehicle off the road, away from your station. A flagger is difficult to see when next to a vehicle. Never sit in or on your vehicle while flagging.
  - Know proper hand and flag signals as shown in the Minnesota Flagger Handbook.
  - Stand alone, do not mingle with the work crew or motorists.
  - Make sure you are visible to approaching traffic, not standing where the sun is obstructing visibility or in a shadow.
  - Review the decision sight distance chart in the Minnesota Flagger Handbook. The driver should be able to recognize you as a flagger for at least the decision sight distance. Avoid blind spots past curves in the roadway or just over hills.
  - **Emergency vehicles** have “priority rights”. Allow them to pass as quickly and safely as possible.

*Flagger Signature* \_\_\_\_\_

*Date* \_\_\_\_\_



**Mn/DOT District & Central Office and Gopher State One-Call  
Office Phone Numbers**

District 1 Hdqrs. - Duluth	Minnesota Dept. of Transportation 1123 Mesaba Avenue Duluth, MN 55811 218-725-2700
District 1 - Virginia	Minnesota Dept. of Transportation 101 N. Hoover Road Virginia, MN 55792 218-742-1100
District 2A - Bemidji	Minnesota Dept. of Transportation 3919 Highway 2 West Bemidji, MN 56619 218-755-6500
District 2B - Crookston	Minnesota Dept. of Transportation 1320 Sunflower Street Crookston, MN 56716 218-277-7950
District 3 Hdqrs. - Baxter	Minnesota Dept. of Transportation 7694 Industrial Park Road Baxter, MN 56425-8096 218-828-5700
District 3 - St. Cloud	Minnesota Dept. of Transportation 3725 12th Street North St. Cloud, MN 56303-2107 320-223-6500
District 4 Hdqrs. - Detroit Lakes	Minnesota Dept. of Transportation 100 Highway 10 West Detroit Lakes, MN 56501 218-846-3600
District 4 - Morris	Minnesota Dept. of Transportation 610 Highway 9 South Morris, MN 56267 320-208-7000
District 6 Hdqrs. - Rochester	Minnesota Dept. of Transportation 2900 48th Street NW Rochester, MN 55901-5848 507-286-7500
District 6 - Owatonna	Minnesota Dept. of Transportation 1010 21st Avenue NW Owatonna, MN 55060-1005 507-446-5500

## Mn/DOT District & Central Office and Gopher State One-Call Office Phone Numbers

District 7 Hdqrs. - Mankato	Minnesota Dept. of Transportation 2151 Bassett Drive Mankato, MN 56001-6888 507-304-6100
District 7 - Windom	Minnesota Dept. of Transportation 180 South County Road 26 Windom, MN 56101-1868 507-831-8000
District 8 Hdqrs. - Willmar	Minnesota Dept. of Transportation 2505 Transportation Road Willmar, MN 56201 320-231-5195
District 8 - Marshall Regional Office	Minnesota Dept. of Transportation 1800 East College Drive Marshall, MN 56258 507-537-6146
District 8 - Hutchinson Regional Office	Minnesota Dept. of Transportation 1400 Adams Street SE Hutchinson, MN 55350 320-234-8480
Metropolitan District	Minnesota Dept. of Transportation 1500 West County Road B-2 Roseville, MN 55113-3174 651-234-7500
Central Office Office of Traffic, Safety and Operations	Minnesota Dept. of Transportation Mail Stop 725 1500 West County Road B2 Roseville, MN 55113-3174 651-234-7000
To order more manuals	Minnesota Dept. of Transportation Mail Stop 260, Manual Sales 395 John Ireland Boulevard St. Paul, MN 55155-1899 651-366-3017
Gopher State One-Call Twin City Area Greater Minnesota	612-454-0002 800-252-1166



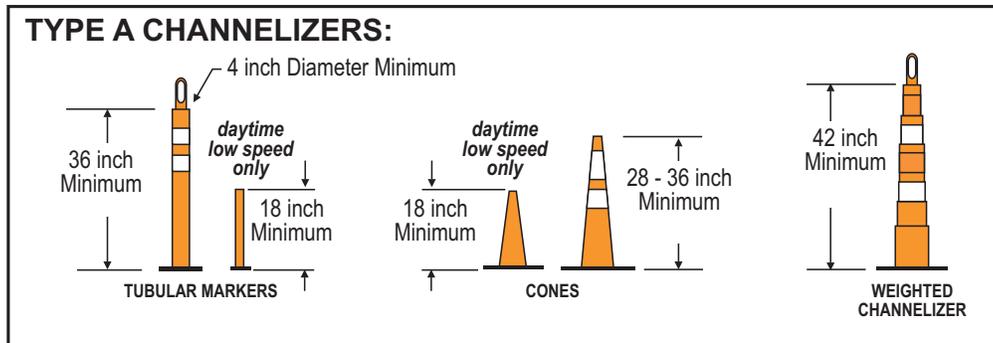
## Temporary Traffic Control Distance Charts

Posted Speed Limit Prior to Work Starting (mph)		Advance Warning Sign Spacing (A) feet	Decision Sight Distance (D) feet	Taper Length (12 ft lane) (L) feet	Shifting Taper (L/2) feet	Typical Shoulder Taper (L/3) feet
0 - 30	<b>G = 25 ft</b>	250	550	200	100	75
35 - 40		325	700	325	175	125
45 - 50	<b>G = 50 ft</b>	600	900	600	300	200
55		750	1200	700	350	250
60 - 65		1000	1400	800	400	275
70 - 75		1200	1600	900	450	300

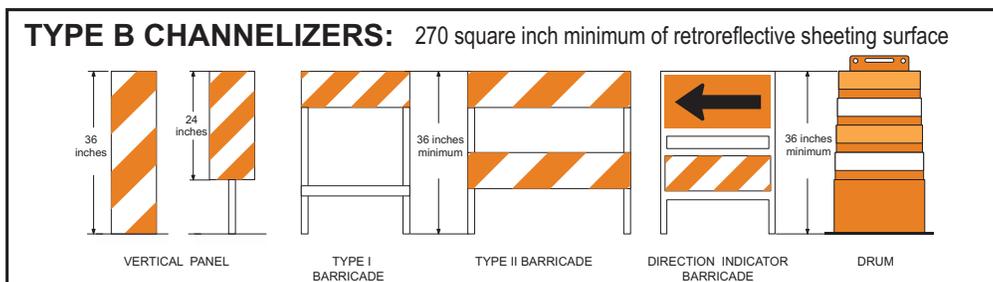
  

Posted Speed Limit Prior to Work Starting (mph)		Buffer Space (B) feet	Shadow Vehicle Following Distance (F) feet	Protection Vehicle Roll-Ahead Buffer Distance (with or without TMA) (R) Moving (15 mph max) Stopped feet feet	
0 - 30	<b>G = 25 ft</b>	200	250 - 550	100	100
35 - 40		305	325 - 700	100	100
45 - 50	<b>G = 50 ft</b>	425	600 - 900	175	125
55		500	750 - 1200	175	125
60 - 65		650	1000 - 1400	225	175
70 - 75		820	1200 - 1600	225	175

**Type A channelizing devices are typically used in attended temporary traffic control zones.\***



**Type B channelizing devices shall be used if the temporary traffic control zone will be installed for more than 12 hours or if it is left unattended. \***



\* See the MN MUTCD, Part 6F for more details on application restrictions.



Minnesota Department of Transportation  
Minnesota Manual on Uniform  
Traffic Control Devices



## Part 7. TRAFFIC CONTROLS FOR SCHOOL AREAS

### 7B. Signs

#### 7B.1 Size of School Signs

##### STANDARD:

Detailed drawings of the standard signs illustrated in this Manual can be found in the Minnesota Standard Signs Manual (see Map & Manual Sales Unit, page ii). Other questions regarding signs and their usage can be referred to the Office of Traffic, Safety and Technology (see page ii). The size of signs to be used in school areas shall be as shown in Table 7B-1 and Appendix C of this Manual.

The Conventional Road sign size shall be used on public roads, streets, and highways unless engineering judgment determines that a Minimum or Oversized sign size would be more appropriate.

The Minimum sign size shall be used only where traffic volumes are low and speeds are 30 mph or lower, as determined by engineering judgment.

The Oversized sign size shall be used on expressways.

##### GUIDANCE:

The Oversized sign sizes should be used on roadways that have four or more lanes with posted speed limits of 40 mph or higher.

##### OPTION:

The sizes in the Oversized column may also be used at other locations that require increased emphasis, improved recognition, or increased legibility.

Signs and plaques larger than those shown in Table 7B-1 and Appendix C of this Manual may be used (see Section 2A.11).

#### 7B.2 Illumination and Reflectorization

##### STANDARD:

The signs used for school area traffic control shall be retroreflectorized or illuminated.

#### 7B.3 Position of Signs

##### SUPPORT:

Sections 2A.16 and 2A.17 contain provisions regarding the placements and locations of signs.

Section 2A.19 contains provisions regarding the lateral offsets of signs.

##### OPTION:

In-roadway signs for school traffic control areas may be used consistent with the requirements of Sections 2B.12, 7B.11, and 7B.12.

#### 7B.4 Height of Signs

##### SUPPORT:

Section 2A.18 contains provisions regarding the mounting height of signs.

#### 7B.5 Installation of Signs

##### SUPPORT:

Section 2A.16 contains provisions regarding the installation of signs.

#### 7B.6 Lettering

##### SUPPORT:

The Federal Highway Administration's "Standard Highway Signs and Markings" book contains information regarding sign lettering.

#### 7B.7 Sign Color for School Warning Signs

##### STANDARD:

School warning signs, including the "SCHOOL" portion of the School Speed Limit (S5-1) sign and including any supplemental plaques used in association with these warning signs, shall have a fluorescent yellow-green background with a black legend and border unless otherwise provided in this Manual for a specific sign.

When the fluorescent yellow-green background color is used, a systematic approach featuring one background color within a zone or area shall be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a zone or area is not allowed.

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Sign	Sign Designation	Section	Conventional Road	Minimum	Oversized
School	S1-1	7B.8	36 x 36	30 x 30	48 x 48
School Bus Stop Ahead	S3-1	7B.13	36 x 36	30 x 30	48 x 48
School Bus Turn Around	S3-2a	7B.14	36 x 36	30 x 30	48 x 48
Reduced School Speed Limit Ahead	S4-5, S4-5a	7B.16	36 x 36	30 x 30	48 x 48
School Speed Limit XX When Flashing	S5-1	7B.15	24 x 48	---	36 x 72
End School Zone	S5-2	7B.9	24 x 30	---	36 x 48
End School Speed Limit	S5-3	7B.15	24 x 30	---	36 x 48
In-Street Ped Crossing	R1-6a, R1-6c	7B.11, 7B.12	12 x 36	---	---
Speed Limit (School Use)	R2-1	7B.15	24 x 30	---	36 x 48
Begin Higher Fines Zone	R2-10	7B.10	24 x 30	---	36 x 48
End Higher Fines Zone	R2-11	7B.10	24 x 30	---	36 x 48

Plaque	Sign Designation	Section	Conventional Road	Minimum	Oversized
XXX to XXX AM XXX to XXX PM	S4-1P	7B.15	24 x 10	---	36 x 18
When Children Are Present	S4-2P	7B.15	24 x 10	---	36 x 18
School	S4-3P	7B.9, 7B.15	24 x 8	---	36 x 12
When Flashing	S4-4P	7B.15	24 x 10	---	36 x 18
Mon-Fri	S4-6P	7B.15	24 x 10	---	36 x 18
All Year	S4-7P	7B.9	24 x 12	---	36 x 18
Fines Higher	R-2-6P	7B.10	24 x 18	---	36 x 24
XX Feet	W16-2P	7B.8	24 x 18	---	30 x 24
XX FT	W16-2aP	7B.8	24 x 12	---	30 x 18
Turn Arrow	W16-5P	7B.8, 7B.9, 7B.11	24 x 12	---	30 x 18
Advance Turn Arrow	W16-6P	7B.8, 7B.9, 7B.11	24 x 12	---	30 x 18
Diagonal Arrow	W16-7P	7B.12	24 x 12	---	30 x 18
Diagonal Arrow (optional size)	W16-7P	7B.12	21 x 15	---	---
Ahead	W16-9P	7B.11	24 x 12	---	30 x 18

- Notes: 1. Larger signs may be used when appropriate.  
 2. Dimensions are shown in inches and are shown as width x height.  
 3. Minimum sizes for multi-lane conventional roads shall be as shown in the Conventional Roads column that face shared-use paths and pedestrian facilities.

**Table 7B-1. School Area Sign and Plaque Sizes**

# Part 8. TRAFFIC CONTROL FOR RAILROAD AND LIGHT RAIL TRANSIT GRADE CROSSINGS

## Chapter 8B. Signs and Markings

### 8B.1 Purpose

#### SUPPORT:

Passive traffic control systems, consisting of signs and pavement markings only, identify and direct attention to the location of a grade crossing and advise road users to slow down or stop at the grade crossing as necessary in order to yield to any rail traffic occupying, or approaching and in proximity to, the grade crossing.

Signs and markings regulate, warn, and guide the road users so that they, as well as LRT vehicle operators on mixed-use alignments, can take appropriate action when approaching a grade crossing.

#### STANDARD:

The design and location of signs shall comply with the provisions of Part 2. The design and location of pavement markings shall comply with the provisions of Part 3.

### 8B.2 Sizes of Grade Crossing Signs

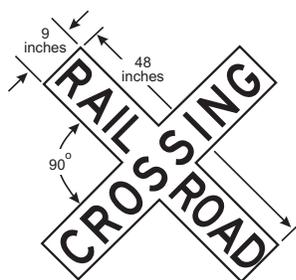
#### STANDARD:

The sizes of grade crossing signs shall be as shown in Table 8B-1 and Appendix C of this Manual.

#### OPTION:

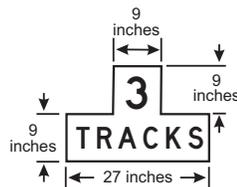
Signs larger than those shown in Table 8B-1 and Appendix C of this Manual may be used (see Section 2A.11).

### 8B.3 Grade Crossing (Crossbuck) Sign (R15-1) and Number of Tracks Plaque (R15-2P) at Active and Passive Grade Crossings



R15-1

Drilled for 90-degree mounting



R15-2P

#### STANDARD:

The Grade Crossing sign (R15-1), commonly identified as the Crossbuck sign, shall be retroreflectorized white with the words RAILROAD CROSSING in black lettering, mounted as shown in Figure 8B-2

#### SUPPORT:

In most States, the Crossbuck sign requires road users to yield the right-of-way to rail traffic at a grade crossing.

#### STANDARD:

.As a minimum, one Crossbuck sign shall be used on each roadway approach to every highway-rail grade crossing, alone or in combination with other traffic control devices.

#### OPTION:

A Crossbuck sign may be used on a highway approach to a highway-LRT grade crossing on a semi-exclusive or mixed-use alignment, alone or in combination with other traffic control devices.

#### STANDARD:

If automatic gates are not present and if there are two or more tracks at a grade crossing, the number of tracks shall be indicated on a supplemental Number of Tracks (R15-2P) plaque of inverted T shape mounted below the Crossbuck sign in the manner shown in Figure 8B-2.

On each approach to a highway-rail grade crossing and, if used, on each approach to a highway-LRT grade crossing, the Crossbuck sign shall be installed on the right-hand side of the highway on each approach to the grade crossing. Where restricted sight distance or unfavorable highway geometry exists on an approach to a grade crossing, an additional Crossbuck sign shall be installed on the left-hand side of the highway, possibly placed back-to-back with the Crossbuck sign for the opposite approach, or otherwise located so that two Crossbuck signs are displayed for that approach.

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Minimum	Oversized
			Single Lane	Multi-Lane			
Stop	R1-1	8B.4 8B.5	30 x 30	36 x 36	36 x 36	---	48 x 48
Yield	R1-2	8B.4 8B.5	36 x 36 x 36	48 x 48 x 48	48 x 48 x 48	30 x 30 x 30	---
No Right Turn Across Tracks	R3-1a	8B.8	24 x 30	30 x 36	---	---	---
No Left Turn Across Tracks	R3-2a	8B.8	24 x 30	30 x 36	---	---	---
Do Not Stop on Tracks	R8-8	8B.9	24 x 30	24 x 30	36 x 48	---	36 x 48
Tracks Out of Service	R8-9	8B.10	24 x 24	24 x 24	36 x 36	---	36 x 36
Stop Here When Flashing	R8-10	8B.11	24 x 36	24 x 36	---	---	36 x 48
Stop Here When Flashing	R8-10a	8B.11	24 x 30	24 x 30	---	---	36 x 42
Stop Here on Red	R10-6	8B.12	24 x 36	24 x 36	---	---	36 x 48
Stop Here on Red	R10-6a	8B.12	24 x 30	24 x 30	---	---	36 x 42
Grade Crossing (Crossbuck)	R15-1	8B.3	48 x 9	48 x 9	---	---	---
Number of Tracks (plaque)	R15-2P	8B.3	27 x 18	27 x 18	---	---	---
Exempt (plaque)	R15-3P	8B.7	24 x 12	24 x 12	---	---	---
Light Rail Only Right Lane	R15-4a	8B.13	24 x 30	24 x 30	---	---	---
Light Rail Only Left Lane	R15-4b	8B.13	24 x 30	24 x 30	---	---	---
Light Rail Only Center Lane	R15-4c	8B.13	24 x 30	24 x 30	---	---	---
Light Rail Do Not Pass	R15-5	8B.14	24 x 30	24 x 30	---	---	---
Do Not Pass Stopped Train	R15-5a	8B.14	24 x 30	24 x 30	---	---	---
No Motor Vehicles on Tracks symbol	R15-6	8B.15	24 x 24	24 x 24	---	---	---
Do Not Drive on Tracks	R15-6a	8B.15	24 x 30	24 x 30	---	---	---
Light Rail Divided Highway symbol	R15-7	8B.16	24 x 24	24 x 24	---	---	---
Light Rail Divided Highway symbol (T-Intersection)	R15-7a	8B.16	24 x 24	24 x 24	---	---	---
Look	R15-8	8B.17	36 x 18	36 x 18	---	---	---
Grade Crossing Advance Warning	W10-1	8B.6	36 Dia.	36 Dia.	48 Dia.	---	48 Dia.
Exempt (plaque)	W10-1aP	8B.7	24 x 12	24 x 12	---	---	---
Grade Crossing and Intersection Advance Warning	W10-2,3,4	8B.6	36 x 36	36 x 36	48 x 48	---	48 x 48
Low Ground Clearance	W10-5	8B.23	36 x 36	36 x 36	48 x 48	---	48 x 48
Low Ground Clearance (plaque)	W10-5P	8B.23	30 x 24	30 x 24	---	---	---
Light Rail Activated Blank-Out symbol	W10-7	8B.19	24 x 24	24 x 24	---	---	---
Trains May Exceed 80 MPH	W10-8	8B.20	36 x 36	36 x 36	48 x 48	---	48 x 48
No Train Horn	W10-9	8B.21	36 x 36	36 x 36	48 x 48	---	48 x 48
No Train Horn (plaque)	W10-9P	8B.21	30 x 24	30 x 24	---	---	---
Storage Space symbol	W10-11	8B.24	36 x 36	36 x 36	48 x 48	---	48 x 48
Storage Space XX Feet Between Tracks and Highway	W10-11a	8B.24	30 x 36	30 x 36	---	---	---
Storage Space XX Feet Between Highway and Tracks Behind You	W10-11b	8B.24	30 x 36	30 x 36	---	---	---
Skewed Crossing	W10-12	8B.25	36 x 36	36 x 36	48 x 48	---	48 x 48
No Gates or Lights (plaque)	W10-13P	8B.22	30 x 24	30 x 24	---	---	---
Next Crossing (plaque)	W10-14P	8B.23	30 x 24	30 x 24	---	---	---
Use Next Crossing (plaque)	W10-14aP	8B.23	30 x 24	30 x 24	---	---	---
Rough Crossing (plaque)	W10-15P	8B.23	30 x 24	30 x 24	---	---	36 x 30
Hidden Crossing	W10-X2	8B.6.1	36 x 36	36 x 36	48 x 48	---	48 x 48
Look for Trains (w/arrows)	W10-X3	8B.6.1	36 x 36	36 x 36	48 x 48	---	48 x 48

- Notes: 1. Larger signs may be used when appropriate.  
2. Dimensions in inches are shown as width x height.  
3. Table 9B-1 shows the minimum sizes that may be used for grade crossing signs and plaques that face shared-use paths and pedestrian facilities.

**Table 8B-1. Grade Crossing Sign and Plaque Minimum Sizes**

**9B.5 BEGIN RIGHT TURN LANE  
YIELD TO BIKES Sign (R4-4)**



R4-4

**OPTION:**

Where motor vehicles entering an exclusive right-turn lane must weave across bicycle traffic in bicycle lanes, the BEGIN RIGHT TURN LANE YIELD TO BIKES (R4-4) sign may be used to inform both the motorist and the bicyclist of this weaving maneuver (see Figures 9C-1, 9C-4, and 9C-5).

**GUIDANCE:**

The R4-4 sign should not be used when bicyclists need to move left because of a right-turn lane drop situation.

**9B.6 Bicycles May Use Full Lane Sign  
(R4-11)**



R4-11

**OPTION:**

The Bicycles May Use Full Lane (R4-11) sign may be used on roadways where no bicycle lanes or adjacent shoulders usable by bicyclists are present and where travel lanes are too narrow for bicyclists and motor vehicles to operate side by side.

The Bicycles May Use Full Lane sign may be used in locations where it is important to inform road users that bicyclists might occupy the travel lane.

Section 9C.7 describes a Shared Lane Marking that may be used in addition to or instead of the Bicycles May Use Full Lane sign to inform road users that bicyclists might occupy the travel lane.

**SUPPORT:**

The Uniform Vehicle Code (UVC) defines a "substandard width lane" as a "lane that is too narrow for a bicycle and a vehicle to travel safely side by side within the same lane."

**9B.7 Bicycle WRONG WAY Sign and  
RIDE WITH TRAFFIC Plaque  
(R5-1b, R9-3cP)**



R5-1b



R9-3cP

**OPTION:**

The Bicycle WRONG WAY (R5-1b) sign and RIDE WITH TRAFFIC (R9-3c) plaque may be placed facing wrong-way bicycle traffic, such as on the left side of a roadway.

This sign and plaque may be mounted back-to-back with other signs to minimize visibility to other traffic.

**STANDARD:**

If used, the RIDE WITH TRAFFIC plaque shall be used only in conjunction with the Bicycle WRONG WAY sign, and be mounted directly below the Bicycle WRONG WAY sign.

**9B.8 NO MOTOR VEHICLES Sign (R5-3)**



R5-3

**OPTION:**

The NO MOTOR VEHICLES (R5-3) sign may be installed at the entrance to a shared-use path.

## 9B.9 Selective Exclusion Signs



R5-6



R9-3



R9-13



R9-14

### OPTION:

Selective Exclusion signs may be installed at the entrance to a roadway or facility to notify road or facility users that designated types of traffic are excluded from using the roadway or facility.

### STANDARD:

If used, Selective Exclusion signs shall clearly indicate the type of traffic that is excluded.

### SUPPORT:

Typical exclusion messages include:

- A. No Bicycles (R5-6),
- B. No Pedestrians (R9-3),
- C. No Skaters (R9-13), and
- D. No Equestrians (R9-14).

### OPTION:

Where bicyclists, pedestrians, and motor-driven cycles are all prohibited, it may be more desirable to use the R5-10a word message sign that is described in Section 2B.39.

## 9B.10 No Parking Bike Lane Signs (R7-9, R7-9a)



R7-9



R7-9a

### STANDARD:

If the installation of signs is necessary to restrict parking, standing, or stopping in a bicycle lane, appropriate signs as described in Sections 2B.46 through 2B.48, or the No Parking Bike Lane (R7-9 or R7-9a) signs shall be installed.

## 9B.11 Bicycle Regulatory Signs (R9-5, R9-6, R10-4, R10-24, R10-25, and R10-26)



R9-5



R9-6



R10-4



R10-24



R10-25



R10-26

### OPTION:

The R9-5 sign may be used where the crossing of a street by bicyclists is controlled by pedestrian signal indications.

Where it is not intended for bicyclists to be controlled by pedestrian signal indications, the R10-4, R10-24, or R10-26 sign (see Section 2B.52) may be used.

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R2-4P		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.16 2B.16 2B.16
R2-4b		Black on White	24 x 48 36 x 72 48 x 96	CR-SL, CR-ML E, O F	2B.16 2B.16 2B.16
R2-6P		Black on White	24 x 18 36 x 24	CR-SL, CR-ML E, F	2B.17,6F.12,7B.10 2B.17,6F.12,7B.10
R2-6aP		Black on White	24 x 18 36 x 24	CR-SL, CR-ML E, F	6F.12,6H.4,7B.10 6F.12,6H.4,7B.10
R2-6bP		Black on White	24 x 18 36 x 24	CR-SL, CR-ML E, F	6F.12,7B.10 6F.12,7B.10
R2-6c		Black on White	24 x 30	CR-SL, CR-ML E, F	2B.16.2 2B.16.2
R2-10		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.17,6F.12, 7B.10 2B.17,6F.12, 7B.10 2B.17
R2-11		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.17,6F.12, 7B.10 2B.17,6F.12, 7B.10 2B.17

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Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R2-12		Black on White	24 x 36 36 x 54	CR-SL, CR-ML E, F	6F.12 6F.12
R2-X5		Black on White	24 x 36	CR-SL, CR-ML	2B.13.1
R3-1		Black and Red on White	24 x 24 36 x 36 48 x 48	CR-SL ,CR-ML, E O	2B.18,6F.6 2B.18,6F.6 2B.18,6F.6
R3-1a		White on Black	24 x 30 30 x 36	CR-SL ,CR-ML	8B.8 8B.8
R3-2		Black and Red on White	24 x 24 36 x 36 48 x 48	CR-SL ,CR-ML, E O	2B.18,6F.6 2B.18,6F.6 2B.18,6F.6
R3-2a		White on Black	24 x 30 30 x 36	CR-SL ,CR-ML	8B.8 8B.8
R3-3		Black on White	24 x 24 36 x 36 48 x 48	CR-SL ,CR-ML, E O	2B.18,6F.6 2B.18,6F.6 2B.18,6F.6
R3-4		Black and Red on White	24 x 24 36 x 36 48 x 48	CR-SL ,CR-ML, E O	2B.18,6F.6 2B.18,6F.6 2B.18,6F.6
R3-5 (R or L)		Black on White	30 x 36	CR-SL, ,CR-ML	2B.20,6F.6

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R7-3		Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-4		Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-5		Green on White	12 x 18	CR-SL, CR-ML	2B.46
R7-6		Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-7		Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-8m		White on Blue	12 x 18	CR-SL, CR-ML	2B.46,2B.48.1
R7-8bP		White on Blue	18 x 9	CR-SL, CR-ML	2B.46,2B.48.1
R7-9		Red on White	12 x 18	B/Rt	9B.10
R7-9a		Black and Red on White	12 x 18	B/Rt	9B.10
R7-20		Green on White	24 x 18	CR-SL, CR-ML	2B.46
R7-21		Green and Black on White	12 x 18	CR-SL, CR-ML	2B.46

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R7-21a		Green and Black on White	12 x 18	CR-SL, CR-ML	2B.46
R7-22		Green and Black on White	12 x 18	CR-SL, CR-ML	2B.46
R7-23		Black and Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-23a		Green and Black on White	12 x 18	CR-SL, CR-ML	2B.46
R7-107		Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-107b		Red and Black on White	12 x 30	CR-SL, CR-ML	2B.46
R7-108		Green on White	12 x 18	CR-SL, CR-ML	2B.46
R7-200		Red and Green on White	24 x 18	CR-SL, CR-ML	2B.46
R7-200a		Red and Green on White	12 x 30	CR-SL, CR-ML	2B.46

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W1-7		Black on Yellow	24 x 12 36 x 18 48 x 24 60 x 30	B-Path B/Rt, LV CR-SL, CR-ML O	9B.15 5C.2,9B.15 2C.47,5C.2,6F.50 2C.47,6F.50
W1-8 (R or L)		Black on Yellow	12 x 18 18 x 24 24 x 30 30 x 36 36 x 48	LV CR-SL, CR-ML O E F	5C.2 2C.9,5C.2,6F.50 2C.9 2C.9,6F.50 2C.9,6F.50
W1-10 (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10a (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10b (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10c (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10d (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10e (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-11 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	CR-SL, CR-ML E F, O	2C.7 2C.7 2C.7
W1-13 (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E, O F	2C.13 2C.13

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, LV--Low Volume  
CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W1-15 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	CR-SL, CR-ML E F, O	2C.7 2C.7 2C.7
W2-1		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M LV, CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3 2C.46,5C.3 2C.46
W2-2 (R or L)		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M LV, CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3 2C.46,5C.3 2C.46
W2-3 (R or L)		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M LV, CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3 2C.46,5C.3 2C.46
W2-4		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M LV, CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3 2C.46,5C.3 2C.46
W2-5		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M LV, CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3 2C.46,5C.3 2C.46
W2-6		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E O	2C.46,5C.3 2C.46,5C.3 2C.46 2C.46
W2-7 (R or L)		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E O	2C.46 2C.46 2C.46 2C.46

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, LV--Low Volume  
CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W2-8 (R or L)		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E O	2C.46 2C.46 2C.46 2C.46
W2-X1		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML O	2C.46 2C.46
W2-X12		Black on Yellow	30 x 30 36 x 36	CR-SL, CR-ML O	2C.46 2C.46
W3-1		Black on Yellow	18 x 18 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M, LV CR-SL, CR-ML CR-SL, CR-ML E, F	9B.19 2C.36,5C.4,6F.16, 8B.6,9B.19 5C.4,6F.50,8B.6 2C.36,6F.50,8B.6
W3-2		Black on Yellow	18 x 18 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M, LV CR-SL, CR-ML CR-SL, CR-ML E, F	9B.19 2C.36,5C.4,6F.16, 8B.6,9B.19 5C.4,6F.50,8B.6 2C.36,6F.50,8B.6
W3-3		Black on Yellow	18 x 18 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M, CR-SL, CR-ML CR-SL, CR-ML E, F	9B.19 2C.36, 6F.50,9B.19 6F.50 2C.36,6F.50
W3-4		Black on Yellow	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F	2C.36,6F.50.2 2C.36,5C.4, 6F.50.2,6I.1 2C.36,5C.4, 6F.50.2,6I.1
W3-5		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.50 2C.38,5G.4,6F.50 2C.36,5G.4,6F.50

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, LV--Low Volume  
CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W3-5a		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.38,6F.50 2C.38,6F.50 2C.38,6F.50
W3-6		Black on Yellow	36 x 36 48 x 48 60 x 60	CR-SL, CR-ML E O	2C.39 2C.39 2C.39
W3-7		Black on Yellow	36 x 36	CR-SL, CR-ML	2C.37
W3-8		Black on Yellow	36 x 36	CR-SL, CR-ML	2C.37
W3-X4		Black on Yellow	66 x 42	CR-SL, CR-ML, M, E, O	2C.36
W3-X5		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.30 6F.30 6F.30
W4-1 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.40 2C.40,6F.50 2C.40,6F.50
W4-1a (R or L)		Black on Orange	36 x 36 48 x 48	CR-SL, CR-ML, M E, F	6F.23.1 6F.23.1
W4-2 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.42,6F.24 2C.42,6F.24 2C.42,6F.24
W4-3 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.41,6F.50 2C.41,6F.50 2C.41,6F.50

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W8-9		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M M CR-SL, CR-ML, E F, O	2C.31 6F.44.2 2C.31,6F.44.2 2C.31,6F.44.2
W8-9a		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.44.1 6F.44.1 6F.44.1
W8-10		Black on Yellow	18 x 18 30 x 30	B-Path B/Rt	9B.17 9B.17
W8-10P		Black on Yellow	12 x 9	B-Path, B/Rt	9B.17
W8-11		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.45 2C.32, 6F.45 2C.32,6F.45
W8-12		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.34 2C.34
W8-12a		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.47 6F.47 6F.47
W8-13		Black on Yellow	24 x 24 36 x 36 48 x 48	M CR-SL, CR-ML, E F, O	2C.32 2C.32 2C.32
W8-14		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, M CR-ML, E F, O	2C.32 2C.32,6F.47 2C.32,6F.47 2C.32,6F.47
W8-15		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, M CR-ML, E F, O	2C.33 2C.33,6F.50 2C.33,6F.50 2C.33,6F.50
W8-15P		Black on Yellow	24 x 18 30 x 24 36 x 30	CR-SL, CR-ML E F, O	2C.33 2C.33,6F.54 2C.33, 6F.54

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W8-16		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML, E F, O	2C.33 2C.33 2C.33 2C.33
W8-17		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML, E F, O	2C.31 2C.31 2C.31 2C.31
W8-17P		Black on Yellow	24 x 18 30 x 24 36 x 30	CR-SL, CR-ML E F, O	2C.31 2C.31
W8-18		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M LV, CR-SL CR-SL, CR-ML, E F, O	2C.35 5G.5, 6F.50 2C.35, 5G.5 6F.50 2C.35, 6F.50
W8-19		Black on Yellow	12 x 72	CR-SL, CR-ML	2C.35
W8-21		Black on Yellow	24 x 24 36 x 36 48 x 48	M CR-SL, CR-ML, E F, O	2C.35 2C.35 2C.35
W8-22		Black on Yellow	24 x 24 36 x 36 48 x 48	M CR-SL, CR-ML, E F, O	2C.35 2C.35 2C.35
W8-23		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M M CR-SL, CR-ML, E F, O	2C.31 6F.44.3 2C.31, 6F.44.3 2C.31, 6F.44.3
W8-24		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.46 6F.46 6F.46
W8-25		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML, E F, O	2C.31 2C.31, 6F.50 2C.31, 6F.50 2C.31, 6F.50

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W17-1		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML O	2C.29 2C.29 2C.29 2C.29
W19-1		Black on Yellow	144 x 48	F	2C.24
W19-2		Black on Yellow	144 x 48	E	2C.24
W19-3		Black on Yellow	48 x 48	F	2C.24
W19-4		Black on Yellow	48 x 48	E	2C.24
W19-5		Black on Yellow	90 x 48	E, F	2C.24
W20-1		Black on Orange	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	6F.18 5G.5,6F.18 5G.5,6F.18
W20-2		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.19,6I.1 6F.19,6I.1 6F.19,6I.1
W20-3		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	6F.20,6I.1 5G.5,6F.20,6I.1 5G.5,6F.20,6I.1
W20-3a		Black on Orange	18 x 18	B-Path	6F.20.1
W20-4		Black on Orange	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	6F.21 5G.5,6F.21 5G.5,6F.21
W20-7		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	6F.31,6I.1 5G.5,6F.31,6I.1 5G.5,6F.31,6I.1

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W20-8		Black on Orange	18 x 18	CR-SL, CR-ML	6E.3
W20-X3		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.24.1,6I.1 6F.24.1,6I.1 6F.24.1,6I.1
W20-X6		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.50 6F.50 6F.50
W20-X11		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.50 6F.50 6F.50
W20-X13 (R or L)		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.22 6F.22 6F.22
W20-X16		Black on Orange	48 x 48	E, F	6F.50
W20-X17		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.50 6F.50 6F.50
W21-1		Black on Orange	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	6F.33 5G.5,6F.33 5G.5,6F.33
W21-2		Black on Orange	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	6F.34 5G.5,6F.34 5G.5,6F.34
W21-3		Black on Orange	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	5G.5,6F.35 6F.35 5G.5,6F.35
W21-4		Black on Orange	36 x 18	CR-SL, CR-ML	6G.6
W21-5		Black on Orange	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	6F.37 5G.5,6F.37 5G.5,6F.37

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W21-5a (R or L)		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.37 6F.37 6F.37
W21-6		Black on Orange	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	6F.38 5G.5,6F.38 5G.5,6F.38
W21-6a		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.38 6F.38 6F.38
W21-7		Black on Orange	30 x 30 36 x 36 48 x 48	M LV, CR-SL, CR-ML E, F, O	6F.39 5G.5,6F.39 5G.5,6F.39
W21-8		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6G.6 6G.6 6G.6
W21-X5 (R or L)		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.22,6I.1 6F.22,6I.1 6F.22,6I.1
W21-X5c		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.23 6F.23 6F.23
W21-X6		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.38.1 6F.38.1 6F.38.1
W21-X8		Black on Yellow	36 x 30	LV	5C.11.1
W21-X9		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.44.2 6F.44.2 6F.44.2
W22-1		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.41 6F.41 6F.41

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CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W22-2		Black on Orange	42 x 36	CR-SL, CR-ML, E, F	6F.42
W22-3		Black on Orange	36 x 30 42 x 36	M CR-SL, CR-ML, E, F	6F.43 6F.43 6F.43
W23-1		Black on Orange	48 x 24	CR-SL, CR-ML, E, F	6F.27
W23-2		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML, E, F	6F.30 2C.52, 6F.30 6F.30
W24-1 (R or L)		Black on Orange	36 x 36 48 x 48	CR-SL, CR-ML, E, F	6F.49 6F.49
W24-1a (R or L)		Black on Orange	36 x 36 48 x 48	CR-SL, CR-ML, E, F	6F.49 6F.49
W24-1b (R or L)		Black on Orange	36 x 36 48 x 48	CR-SL, CR-ML, E, F	6F.49 6F.49
W24-1cP		Black on Orange	24 x 18 30 x 24	CR-SL, CR-ML, E, F	6F.49 6F.49
W25-1		Black on Yellow	24 x 30	CR-SL, CR-ML	2C.48
W25-2		Black on Yellow	24 x 30	CR-SL, CR-ML	2C.48

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