



# Guidelines for Traffic Control In Work Zones

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## **SUPERVISOR'S CHECKLIST**

- 1. Follow Part 6 of the MUTCD. It is the national standard for work zone traffic control.*
- 2. Have a traffic control plan before going to the work site.*
- 3. Ask yourself, "What is the driver's view of the work site - at night, during peak hours, etc.?"*
- 4. Ask yourself, "Would I feel safe driving through this work zone?"*
- 5. Investigate crashes/incidents to identify if changes are needed in the traffic control plan.*
  - Take photographs of all traffic control devices.*
  - Sketch and dimension all devices. Indicate size of signs, placement from the edge of the travelway, and the height to the bottom of the sign.*
- 6. Remove the devices in a timely manner.*

The MUTCD (<http://mutcd.fhwa.dot.gov/>) is the final authority for all questions.

## Introduction

The primary function of temporary traffic control is to provide for the safe and efficient movement of motorists, bicyclists, and pedestrians through or around temporary traffic control (TTC) zones while reasonably protecting workers and equipment. A concurrent objective of the TTC is the efficient construction and maintenance of the highway.

Part 6 of the *Manual on Uniform Traffic Control Devices* (MUTCD) is the national standard for all traffic control devices used during construction, maintenance, and utility activities plus incident management. This handbook summarizes some guidelines listed in the MUTCD. It is directed to state and local government road and street departments, utilities, companies performing construction by permit, and any other entity providing maintenance or construction on a public roadway. It contains basic principles, a description of the standard traffic control devices used in work areas, guidelines for the application of the devices, and typical application diagrams. Also, information concerning proper flagging is presented. The guide gives the basic principles and provides examples for the design, application, installation, and maintenance of the various types of traffic control devices used in temporary traffic control or for incident management.

The application diagrams shown represent minimum requirements for typical situations. They are not intended as substitutes for engineering judgment and should be altered to fit the conditions of a particular site--given that all traffic control devices used must be in compliance with Part 6 of the MUTCD. The MUTCD has been adopted by the Kentucky General Assembly (KRS 189.337 and 603KAR5:050) as the standard for signs and markings in Kentucky.

## Major Traffic Control Considerations

Every work zone situation is different so several items must be considered in determining the TTC needed. Following is a list of some questions that illustrate the major traffic control considerations.

1. What will be the time duration of the work?
  - Long-term stationary - Work that occupies a location more than three days.
  - Intermediate-term stationary - Work that occupies a location for more than one daylight period and up to 3 days, or nighttime work lasting more than 1 hour.
  - Short-term stationary - Daytime work that occupies a location for more than 1 hour within a single daylight period.
  - Short duration - Work that occupies a location up to one hour.
  - Mobile - Work that moves intermittently or continuously.
2. Where is the work zone located (on the roadway, on the shoulder, or off the roadway)?
3. What type of road is involved?
4. What is the speed of the traffic?
5. What is the traffic volume on the roadway? Should the work be rescheduled to avoid heavy volume conditions?
6. Will the nature of traffic change while work is underway?
7. Do the local law enforcement agencies need to be notified?
8. What kind of signing will be required?
9. Are cones, drums, barricades, or an arrow board needed for traffic channelization?
10. Will a flagger be required?

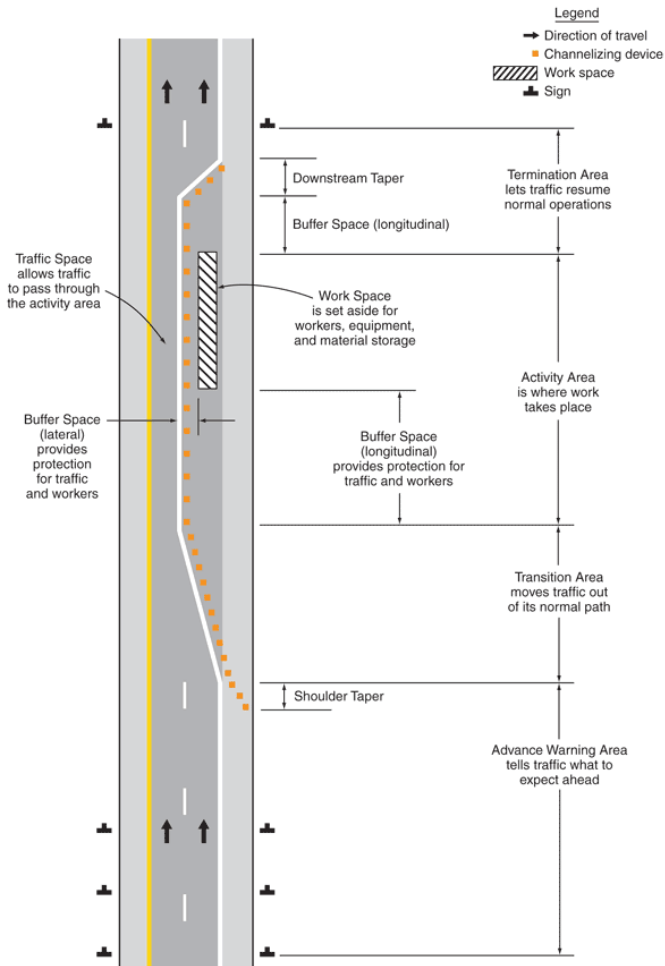
## **Fundamental Principles**

Road user and worker safety and accessibility in TTC zones should be an integral element in every project from planning through design and construction. Consideration must be given to motorists, bicyclists, pedestrians and workers. If the TTC zone includes a grade crossing, there should be early coordination with the railroad company.

Following are the seven fundamental principles of TTC as given in the MUTCD.

1. General plans or guidelines should be developed to provide safety for motorists, bicyclists, pedestrians, workers, enforcement officials and equipment.
2. Road user movement should be inhibited as little as practical.
3. Motorists, bicyclists and pedestrians should be guided in a clear and positive manner while approaching and traversing TTC zones and incident sites.
4. Routine day and night inspections of TTC elements should be performed.
5. Attention should be given to the maintenance of roadside safety during the life of the TTC zone.
6. Each person whose actions affect TTC zone safety should receive training appropriate to the job decisions each individual is required to make.
7. Good public relations should be maintained.

# Component Parts of a Temporary Traffic Control Zone



## Tapers

### Merging Taper

A merging taper requires the longest distance because drivers are required to merge into common road space. A merging taper should be long enough to enable merging drivers to have adequate advance warning and sufficient length to adjust their speeds and merge into an adjacent lane before the downstream end of the transition.

Following is a table of merging taper lengths (L) and the spacing of channelizing devices for various speeds and widths of closing.

### Taper Length\*

SPEED LIMIT (MPH)	LANE WIDTH (FEET)			SPACING BETWEEN DEVICES (FEET)
	10	11	12	
25	105	115	125	25
35	205	225	245	35
45	450	495	540	45
55	550	605	660	55
65	650	715	780	65
70	700	770	840	70

\*Following are the formulas used to calculate taper length:

Posted Speed	Formula
40 mph or under	$L = WS^2/60$
45 mph or over	$L = WS$

where: L = taper length; W = width of lane or offset, and S = posted speed, or off-peak 85th percentile speed

### Shifting Taper

A shifting taper is used when a lateral shift is needed. A shifting taper should have a length of approximately 0.5 L.



## **Shoulder Taper**

A shoulder taper may be beneficial on a high-speed roadway where shoulders are part of the activity area and are closed, or when improved shoulders might be mistaken as a driving lane. Shoulder tapers should have a length of approximately 0.33 L.

## **Downstream Taper**

A downstream taper may be useful in termination areas to provide a visual clue to the driver that access is available into the original lane or path that was closed. A downstream taper should have a minimum length of 50 feet and a maximum length of 100 feet with devices placed at a spacing of approximately 20 feet.

## **One-Lane, Two-Way Taper**

A one-lane, two-way taper is used in advance of an activity area that occupies part of a two-way roadway in such a way that a portion of the road is used alternately by traffic in each direction. A one-lane, two-way taper should have a minimum length of 50 feet and a maximum length of 100 feet, with channelizing devices at approximately 20-foot spacings.

## **Flagging**

### **Flaggers**

A flagger shall be a person who provides temporary traffic control. A flagger should possess the following abilities:

1. Receive and communicate instructions clearly, firmly, and courteously
2. Move quickly to avoid danger
3. Control signaling devices
4. Understand and apply safe traffic control practices
5. Recognize dangerous traffic situations and warn workers in sufficient time

## **High Visibility Clothing**

For daytime and nighttime work, flaggers shall wear high-visibility safety apparel. The background material color shall be fluorescent orange-red, fluorescent yellow-green or a combination of the two. The retroreflective material shall be either orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 feet. The retroreflective clothing shall be designed to clearly identify the wearer as a person.

## **Hand-Signaling Devices**

The sign paddle bearing the message STOP or SLOW provides road users with more positive guidance than flags and should be the primary hand-signaling device.

The STOP/SLOW paddle shall have an octagonal shape on a rigid handle. STOP/SLOW paddles shall be at least 18 inches wide with letters at least 6 inches high and should be fabricated from light semi-rigid material. The background of the STOP face shall be red with white letters and a white border. The background of the SLOW face shall be orange with black letters and a black border. When used at night, the STOP/SLOW paddle shall be retroreflectorized.

Flags, used only in emergency situations, shall be red or fluorescent orange/red in color, shall be a minimum of 24 inches square, and shall be securely fastened to a staff that is approximately 36 inches in length. The free edge of a flag should be weighted so the flag will hang vertically, even in heavy winds. When used at nighttime, flags shall be retroreflectorized red.

## **Flagger Stations**

Flagger stations shall be located far enough in advance of the work space so that approaching road

users will have sufficient distance to stop at an intended stopping point..

Guidelines for determining visibility to the flagger station and also distance from flagger to work-space (buffer distance) are shown in the table on page 17. The distances shown may be increased for downgrades and other conditions that affect stopping distance.

Flagger stations should be preceded by proper advance warning signs. At night, flagger stations should be illuminated.

The flagger should stand either on the shoulder adjacent to the road user being controlled or in the closed lane prior to stopping road users. A flagger should only stand in the lane being used by moving road users after road users have stopped. The flagger should be clearly visible to the first approaching road user at all times. The flagger also should be visible to other road users. The flagger should be stationed sufficiently in advance of the workers to warn them (for example, with audible warning devices such as horns, whistles, etc.) of approaching danger by out-of-control vehicles. The flagger should stand alone, away from other workers, work vehicles, or equipment.

At spot lane closures where adequate sight distance is available for the safe handling of traffic, the use of one flagger may be sufficient. At a spot construction, the flagger may have to take a position on the shoulder opposite the closed section in order to operate effectively.

## **Flagging Procedures**

The following methods of signaling with paddles shall be used:

1. **To stop road users**, the flagger shall face road users and aim the STOP paddle face toward road users in a stationary position with the arm extended horizontally away from the body.

The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.

2. **To direct stopped road users to proceed**, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body. The flagger shall motion with the free hand for road users to proceed.
3. **To alert or slow traffic**, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body.

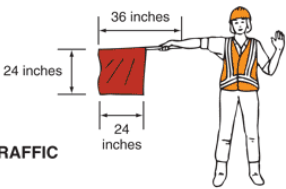
The following methods of signaling with a flag shall be used:

1. **To stop road users**, the flagger shall face road users and extend the flag staff horizontally across the road users' lane in a stationary position so that the full area of the flag is visibly hanging below the staff. The free arm shall be held with the palm of the hand above the shoulder level toward approaching traffic.
2. **To direct stopped road users to proceed**, the flagger shall face road users with the flag and arm lowered from the view of the road users, and shall motion with the free hand for road users to proceed. Flags shall not used to signal road users to proceed.
3. **To alert or slow traffic**, the flagger shall face road users and slowly wave the flag in a sweeping motion of the extended arm from shoulder level to straight down without raising the arm above a horizontal position. The flagger shall keep the free hand down.

The use of the flag and sign paddle are displayed in the following illustration.

**PREFERRED METHOD  
STOP/SLOW PADDLE**

**EMERGENCY SITUATIONS ONLY  
RED FLAG**



**TO STOP TRAFFIC**



**TO LET  
TRAFFIC PROCEED**



**TO ALERT AND  
SLOW TRAFFIC**

## **Communication**

When two flaggers are used, they can communicate verbally or visually if they are close enough and visible to each other. One of the flaggers should be designated as the coordinator. Where the end of a one-lane section is not visible from the other end, the flaggers may maintain control using such methods as:

1. Radio or field telephone,
2. Flag transfer method where the driver of the last vehicle proceeding into the one-lane section is given a red flag (or other token) and instructed to deliver it to the flagger at the other end,
3. An official car that follows the last road user proceeding through the section, or
4. A pilot car to guide a queue of vehicles through the temporary traffic control zone or detour.

The flag transfer or official car method should only be used for a maximum length of about one mile. The pilot car shall have a sign mounted on the rear of the vehicle.

## **Arrow Boards**

Flashing arrow boards are effective day and night, for moving traffic out of a lane to the left or right, and may be used for tapered lane closures and moving operations. The minimum size must be 48" x 24" with at least 12 panel lamps to provide a minimum legibility distance of 1/2 mile. Arrow boards should be equipped with a dimming device capable of 50 percent dimming for use at night along with circular hoods. If an arrow board consisting of a matrix bulb is used, the elements should be recess-mounted or equipped with an upper

hood of not less than 180 degrees. The only permissible use of an arrow board on a two-lane, two-way street or road is the caution mode.

An arrow board shall be a sign with a matrix of elements capable of either flashing or sequential displays. This sign shall provide additional warning and directional information to assist in merging and controlling road users through or around a temporary traffic control zone.

An arrow board should be used in combination with appropriate signs, channelizing devices, or other temporary traffic control devices. An arrow board should be placed on the shoulder of the roadway or, if practical, further from the traveled lane. It should be delineated with retroreflective temporary traffic control devices, or when within the clear zone, shielded with a barrier or crash cushion. When an arrow board is not being used, it should be removed; if not removed, it should be shielded; or if the previous two options are not feasible, it should be delineated with retroreflective temporary traffic control devices.

***NOTE: Review and understand the full text of Section 6F.61 of the MUTCD prior to implementing a traffic plan using Arrow Boards.***

## **Channelizing Devices**

The function of channelizing devices is to warn road users of conditions created by work activities in or near the roadway and to guide road users.

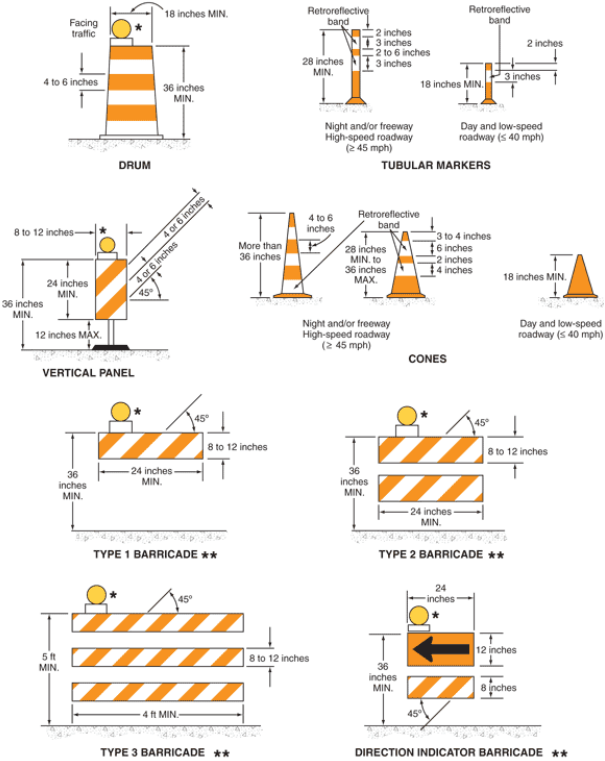
Channelizing devices shall be crashworthy. The spacing of channelizing devices should not exceed a distance in feet equal to 1.0 times the speed limit when used for taper channelization and a distance in feet equal to 2.0 times the speed limit when used for tangent channelization.

Devices that are damaged or have lost a significant amount of their retroreflectivity and effectiveness shall be replaced.

# Channelizing Devices

*NOTE: Warning lights on Channelizing Devices are optional.*

**Figure 6F-7. Channelizing Devices**



\* Warning lights (optional)  
\*\* Rail stripe widths shall be 6 inches, except that 4-inch wide stripes may be used if rail lengths are less than 36 inches. The sides of barricades facing traffic shall have retroreflective rail faces.



## Warning Lights

Warning lights 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. Flashing warning lights shall not be used for delineation, as a series of flashers fails to identify the desired vehicle path. Warning lights shall have a minimum mounting height of 30 inches to the bottom of the lens.

**Type A Low-Intensity** flashing warning lights are used to warn road users during nighttime hours that they are approaching or proceeding into a potentially hazardous area. Type A warning lights may be mounted on channelizing devices.

**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. Type B warning lights may be mounted on advance warning signs or on independent supports.

**Type C Steady-Burn and Type D 360-degree Steady-Burn** warning lights may be used during nighttime hours to delineate the edge of the traveled way. When used to delineate a curve, Type C warning lights should only be used on devices on the outside of the curve, and not on the inside of the curve.

## Nighttime Operations

All traffic control devices shall be retroreflectorized when used at night. Workers shall wear retroreflectorized vests. Cones shall be equipped with a reflective collar when used at night. When barricades are used, it is desirable to add flashing lights when the barricades are used singly and steady burn lights when they are used in a series for channelization. If a flagger is used, the flagger stations should be adequately illuminated.

## Signs

### Types

1. **Regulatory signs** inform road users of traffic laws

or regulations and indicate the applicability of legal requirements that would not otherwise be apparent. Regulatory signs shall be authorized by the public agency or official having jurisdiction. They are generally rectangular with a black legend and border on a white background. Exceptions include the STOP, YIELD, DO NOT ENTER, WRONG WAY, and ONE WAY signs.

2. **Warning signs** in temporary traffic control zones notify road users of specific situations or conditions on or adjacent to a roadway that might not otherwise be apparent. Temporary traffic control warning signs shall be diamond-shaped with a black symbol or message and border on an orange or fluorescent orange background, except for the Highway-Rail Grade Crossing Advance Warning sign and except for signs that are permitted in Part 2 or 7 of the MUTCD to have yellow or fluorescent yellow-green backgrounds.
3. **Guide signs** provide road users with information to help them along their way through the temporary traffic control zone. The design of guide signs is presented in Part 2 of the MUTCD. The following guide signs should be used in temporary traffic control zones as needed: standard route markings, directional signs, street name signs, and special guide signs relating to the condition of work being done. If additional guide signs are used in temporary traffic control zones, they shall have a black legend on an orange background.

### **Size**

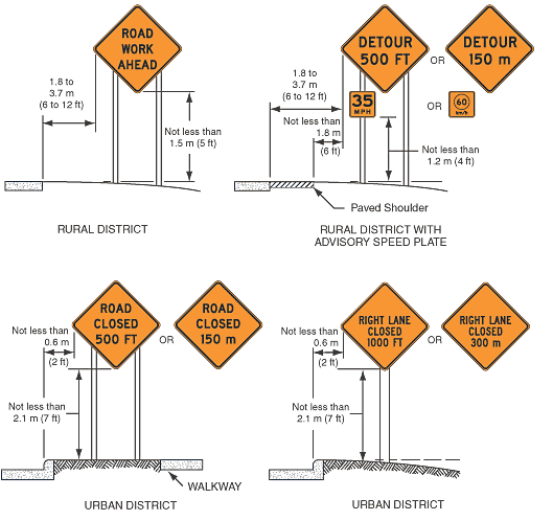
Advance warning signs for higher-speed locations shall have a size of 48 x 48 inches. Where speeds and volumes are moderately low, a minimum size of 36 x 36 inches may be used for advance warning signs. Appropriate sizes of signs are provided in Table 6F-1 of the MUTCD. Deviations from standard sizes shall be in 6-inch increments.

# Sign Supports

Fixed sign supports should be used on long-term projects. Portable supports are more practical for intermediate and short-term projects. Following are illustrations of height and lateral locations of signs on fixed supports and methods of mounting other than on posts. Signs mounted on barricades or other supports may be at lower heights than on fixed supports but the bottom of the sign shall be no less than one foot above the traveled way.

# Sign Placement

Signs should normally be located on the right side of the roadway. Where special emphasis is needed, signs may be placed on both the left and right sides of the roadway. Signs mounted on barricades and barricade/sign combinations shall be crashworthy. Neither portable nor permanent sign supports should be located on sidewalks, bicycle lanes, or areas designated for pedestrian or bicycle traffic. Signs mounted on portable supports should not be used for a duration of more than three days.



## Advance Warning Area

The distance from the first sign to the start of the transition area should be long enough to give motorists adequate time to respond to the conditions. Guidelines are presented in the summary of layout dimensions as referenced in the following typical application diagrams (A, B, C).

### Summary of Layout Dimensions Sign Spacing

Road Type	Distance Between Signs (feet)		
	A	B	C
Urban (<40 mph)	100	100	100
Urban (Eq. or >45 mph)	350	350	350
Rural	500	500	500
Expressway/Freeway	1,000	1,500	2,640

### Channelizing Device Spacing

	Taper	Buffer/Work Space	Downstream
Two-lane	20'	2 x Speed Limit	20'
Multi-lane	Speed Limit	2 x Speed Limit	20'

### Summary of Layout Dimensions Tapers and Flagger Stations (feet)

Speed Limit (MPH)	Multi Lane			Flagger Visibility/ Buffer Distance
	Merging Taper (12' Lane)	Shifting Taper (12' Lane)	Shoulder Taper (10' Lane)	
20	80	40	25	115
25	125	70	35	155
30	180	90	50	200
35	245	130	70	250
40	320	160	90	305
45	540	270	150	360
50	600	300	170	425
55	660	330	190	495
60	720	360	200	570
65	780	390	220	645
70	840	420	240	730

Notes: Downstream taper = 50 ft - 100 ft

One-Lane, Two Way Taper = 50 ft - 100 ft

## Typical Application Diagrams

The diagrams on the following pages represent examples of the application of principles and procedures for safe and efficient temporary traffic control in work zones. The layouts represent minimum requirements. It is not possible to include illustrations to cover every situation which will require work area protection. They are not intended as a substitute for engineering judgment and should be altered to fit the conditions of a particular site. All traffic control devices used must be in compliance with the MUTCD. Guidelines for taper lengths are given. Refer to page 5 for more specific information on taper lengths. For further information, refer to Part 6 of the MUTCD (using the “TA-” number listed on each layout to identify that illustration in the MUTCD).



Arrow panel



Arrow panel support or trailer



Channelizing device



Direction of traffic



Flagger



High level warning device (Flag tree)



Sign (Shown facing left)



Temporary barrier



Truck mounted attenuator



Type III Barricade



Warning lights



Work space

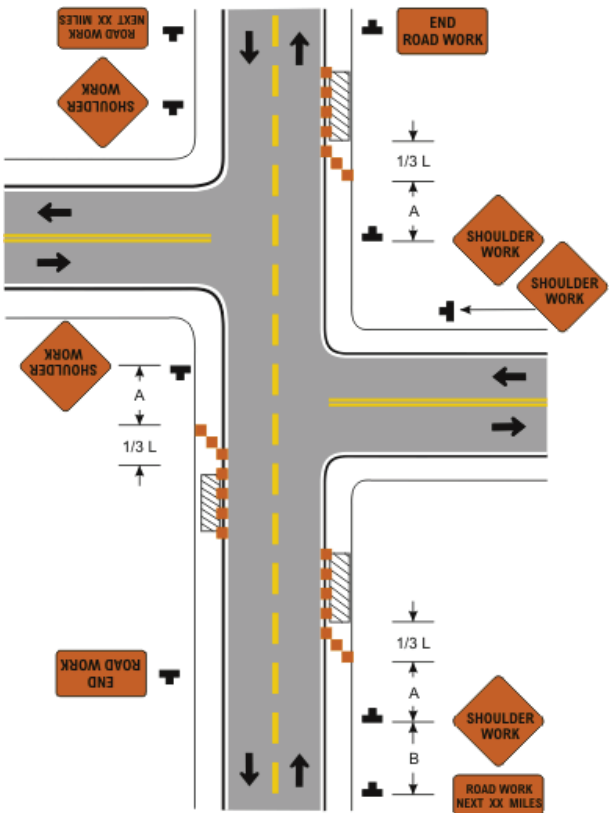


Work vehicle

## Work on Shoulder (TA-3)

A SHOULDER WORK sign should be placed on the left side of the roadway for a divided or one-way street only if the left shoulder is affected.

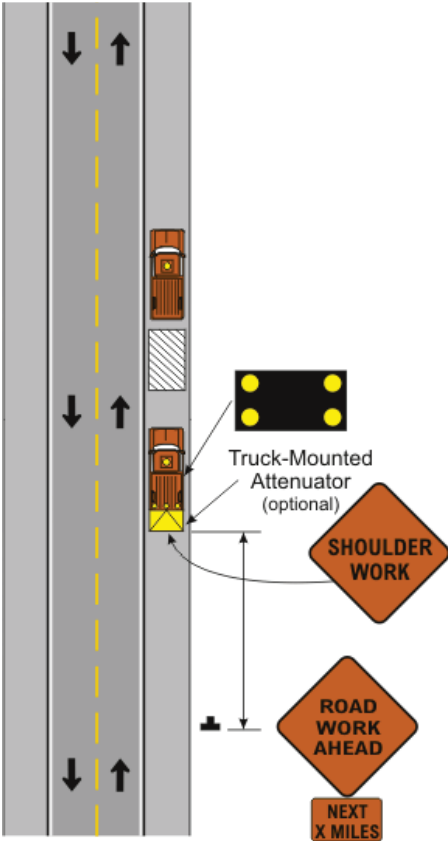
Although vehicle hazard warning signals can be used to supplement the rotating lights or strobe lights, they shall not be used instead of rotating lights or strobe lights.



## Short-Duration or Mobile Operations on Shoulder (TA-4)

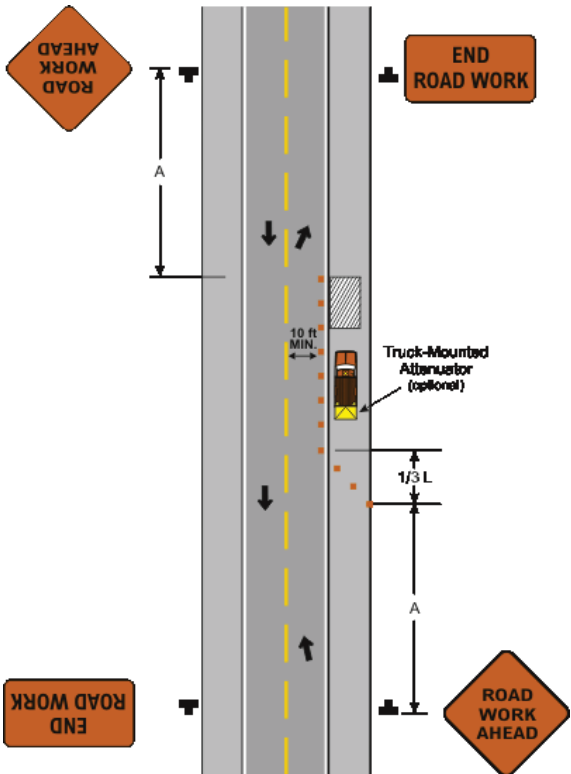
Although vehicle hazard warning signals can be used to supplement the rotating lights or strobe lights, they shall not be used instead of rotating lights or strobe lights. If an arrow panel is used for an operation on the shoulder, the caution mode shall be used.

The distance between the advance warning sign and the work should not exceed 5 miles. Use supplemental distance plaque when distance to work is 2 to 5 miles.



## Shoulder Work with Minor Encroachment (TA-6)

All lanes should be a minimum of 10 feet in width as measured to the near face of the channelizing devices. The treatment shown should be used on a minor road having low speeds. For higher-speed traffic conditions, a lane closure should be used. Although vehicle hazard warning signals can be used to supplement the rotating lights or strobe lights, they shall not be used instead of rotating lights or strobe lights.





## **Lane Closure on Two-Lane Road Using Flaggers (TA-10)**

Channelizing devices should be extended to a point where they are visible to approaching road users. Floodlights should be provided as needed to mark flagger stations at night. The ROAD WORK AHEAD and the END ROAD WORK sign may be omitted for short-duration operations. When used, the BE PREPARED TO STOP sign should be located between the advance flagger sign and the ONE LANE ROAD sign.

When a highway-rail grade crossing exists within or upstream of the transition area and it is anticipated that backups resulting from the lane closure might extend through the highway-rail grade crossing, the temporary traffic control zone should be extended so that the transition area precedes the highway-rail grade crossing.

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

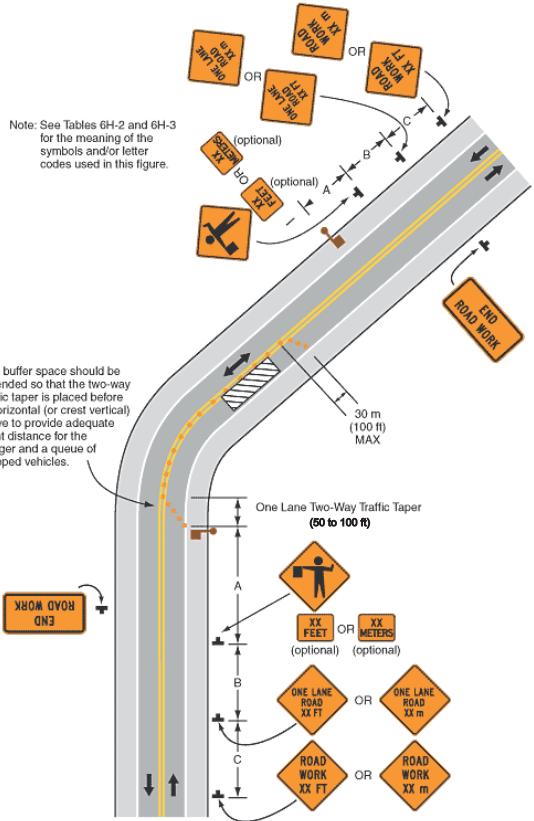
When a highway-rail grade crossing exists within the activity area, drivers operating on the left side of the normal centerline should be provided with comparable warning devices as for drivers operating on the right side of the normal centerline. Early coordination with the railroad company should occur before work starts.

*(See Illustration on Next Page)*

# Lane Closure on Two-Lane Road Using Flaggers (TA-10)

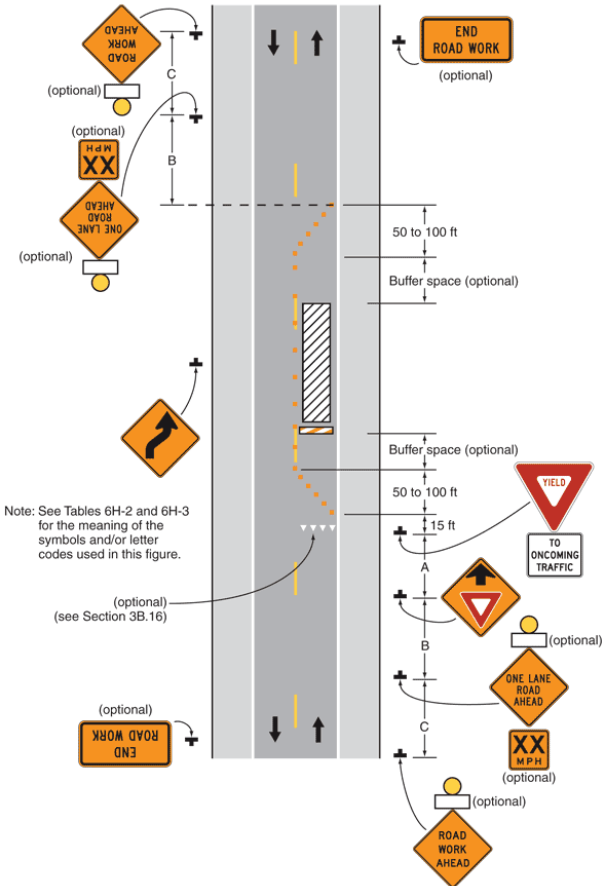
Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

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



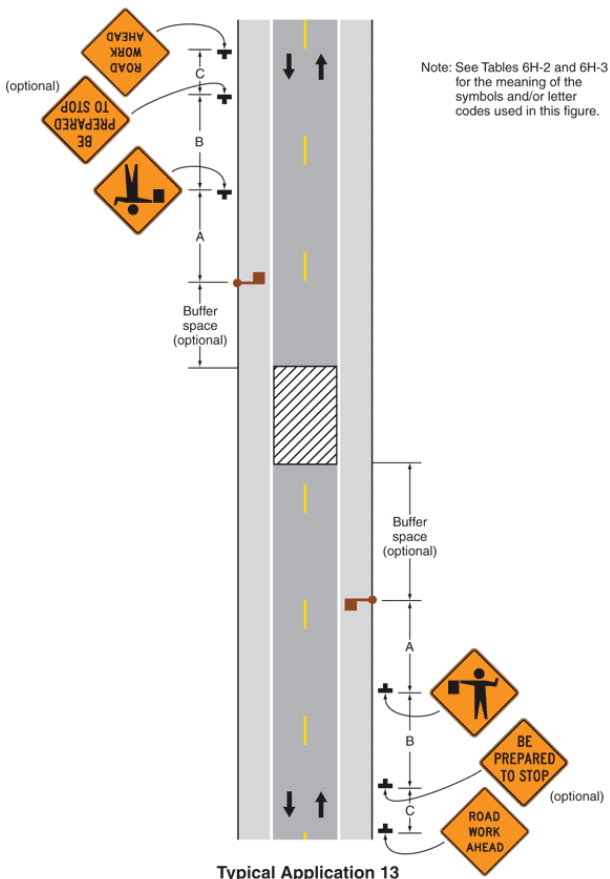
## Lane Closure on Low-Volume Two-Lane Road (TA-11)

When flaggers are used, the Flagger symbol sign shall be used in place of the YIELD AHEAD sign.



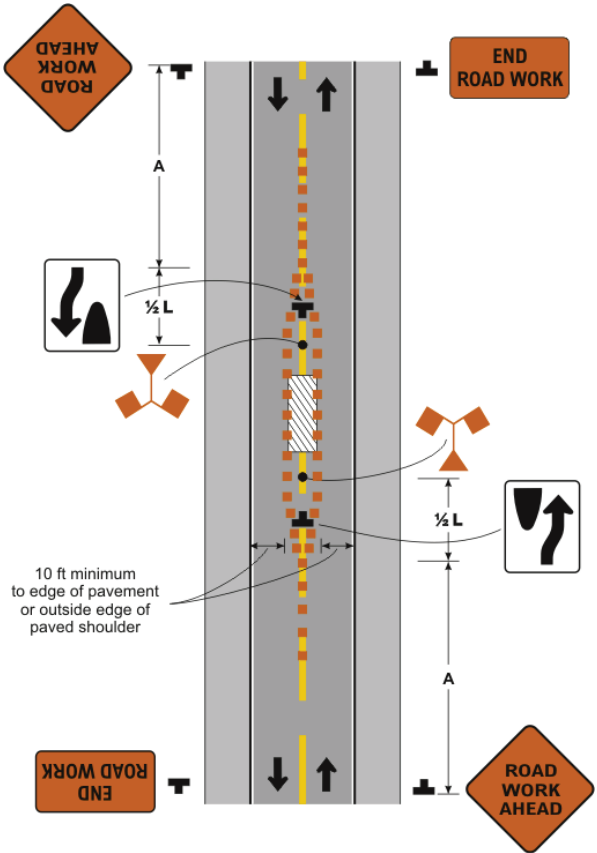
## Temporary Road Closure (TA-13)

Conditions represented are a planned closure not exceeding 20 minutes during the daytime. The flagger shall follow the procedures noted in “Flagging” beginning on page 6. When used, the BE PREPARED TO STOP sign should be located before the flagger symbol sign.



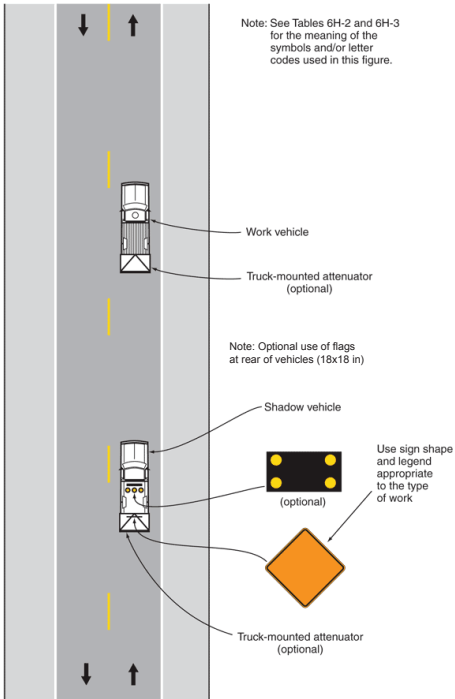
# Work in Center of Low-Volume Road (TA-15)

The lanes on either side of the center work space should have a minimum width of 10 feet as measured from the near edge of the channelizing devices to the edge of pavement or the outside edge of paved shoulder. Although vehicle hazard warning signals can be used to supplement the rotating lights or strobe lights, they shall not be used instead of rotating lights or strobe lights.



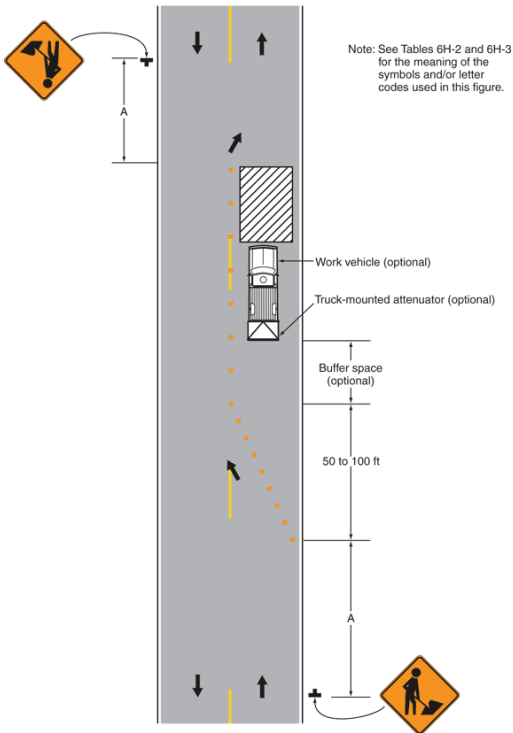
# Mobile Operations on Two-Lane Road (TA-17)

Vehicle-mounted signs shall be mounted in a manner such that they are not obstructed by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress. Shadow and work vehicles shall display rotating lights or strobe lights. Where practical and when needed, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass. Whenever adequate stopping sight distance exists to the rear, the shadow vehicle should maintain the minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should slow down in advance of vertical or horizontal curves that restrict sight distance. A truck-mounted attenuator may be used on the shadow vehicle. The shadow vehicles should also be equipped with two high-intensity flashing lights mounted on the rear, adjacent to the sign.



## Lane Closure on Minor Street (TA-18)

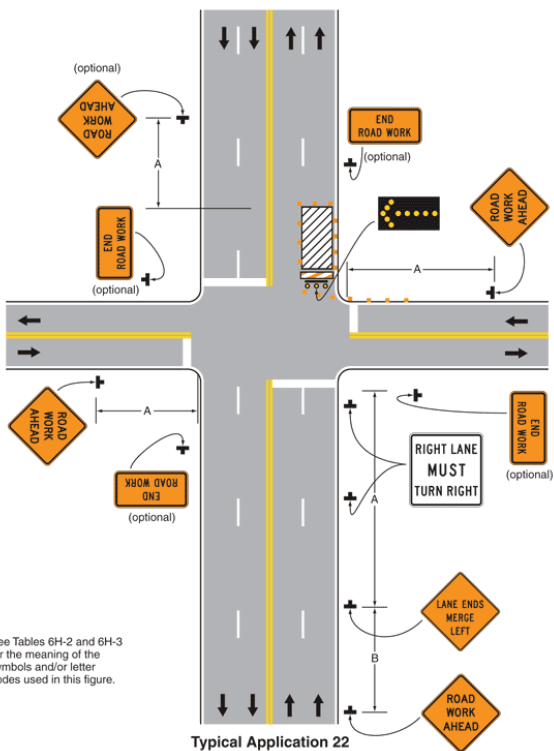
This temporary traffic control shall be used only for low-volume, low-speed facilities. Where the work space is short, where drivers can see the roadway beyond, and where volume is low, motor vehicle traffic may be self-regulating. Where motor vehicle traffic cannot effectively self-regulate, one or two flaggers shall be used as illustrated on page 23 (TA-10). Flashing warning lights and/or flags may be used to call attention to the advance warning signs. A truck-mounted attenuator may be used on the work vehicle and the shadow vehicle.



Typical Application 18

## Right Lane Closure on Far Side of Intersection (TA-22)

If the work space extends across the crosswalk, the crosswalk should be closed.



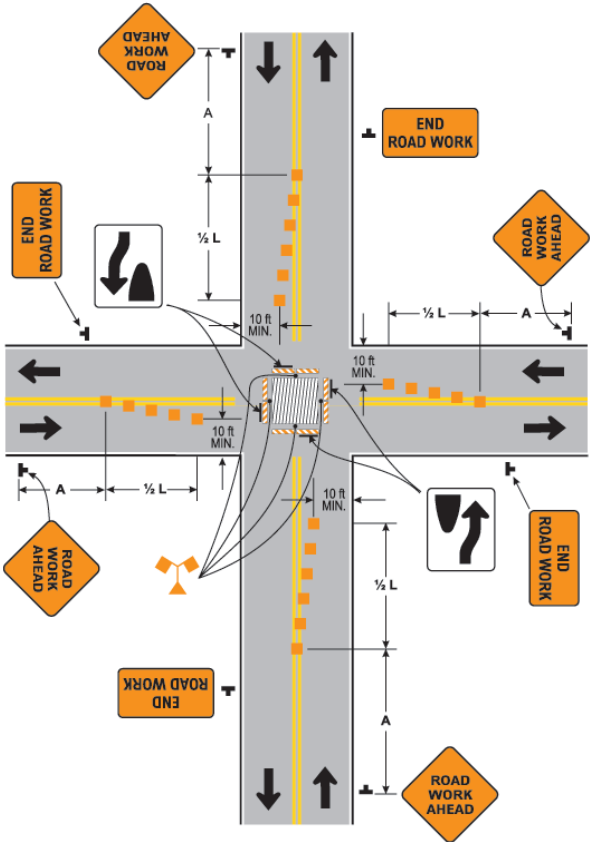
Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 22



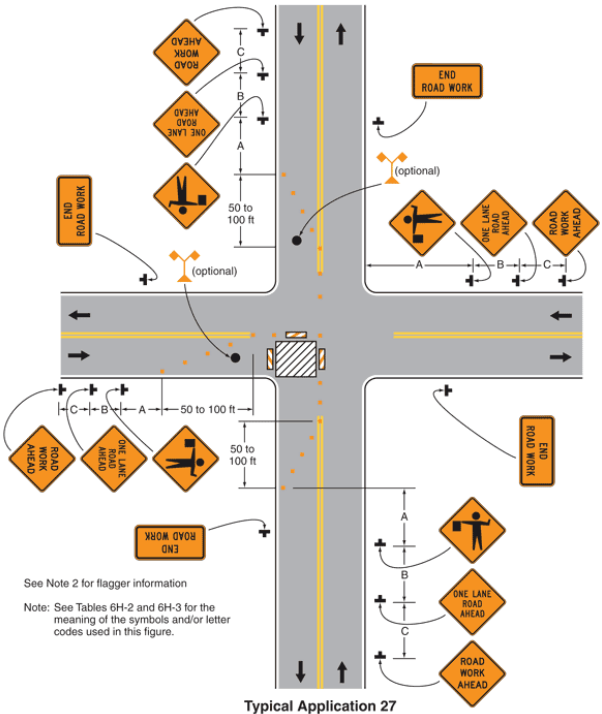
## Closure in Center of Intersection (TA-26)

A high-level warning device may be placed in the work space, if there is sufficient room. All lanes should be a minimum of 10 feet in width as measured to the near face of the channelizing devices. Although vehicle hazard warning signals can be used to supplement the rotating lights or strobe lights, they shall not be used instead of rotating lights or strobe lights.



## Closure at Side of Intersection (TA-27)

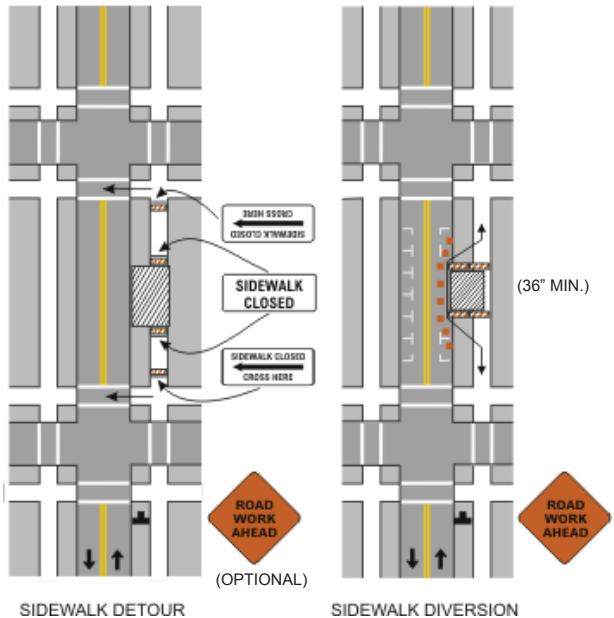
The situation depicted can be simplified by closing one or more of the intersection approaches. If this cannot be done, and/or when capacity is a problem, through motor vehicle traffic should be directed to other roads or streets. Depending on road user conditions, flagger(s) or uniformed law enforcement officer(s) should be used to direct road users within the intersection. Although vehicle hazard warning signals can be used to supplement the rotating lights or strobe lights, they shall not be used instead of rotating lights or strobe lights.



## Sidewalk Closures and Bypass Sidewalks (TA-28)

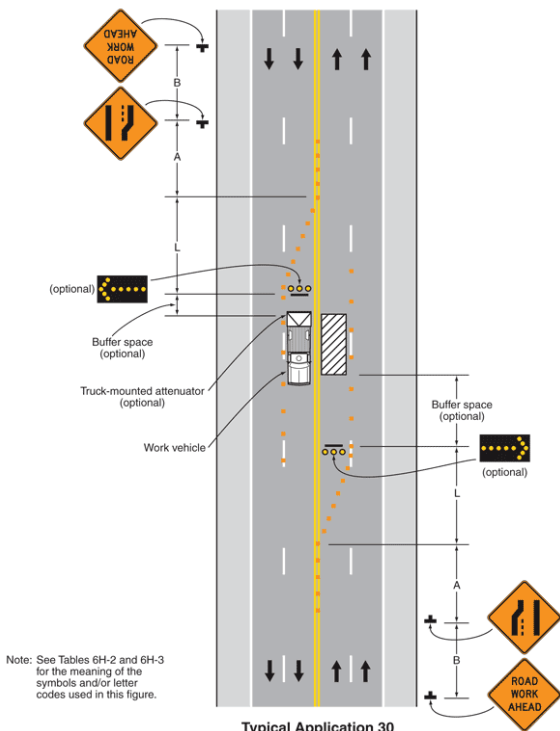
Where sidewalks exist, provisions shall be made for disabled pedestrians.

Where high speeds are anticipated, a temporary traffic barrier and, if necessary, a crash cushion should be used to separate the temporary sidewalks from motor vehicle traffic.



## Interior Lane Closure on Multilane Street (TA-30)

This information applies to low-speed, low-volume urban streets. Where speed or volume is higher, additional signing such as LEFT LANE CLOSED XX FEET should be used between the signs shown. When a highway-rail grade crossing exists within or upstream of the transition area and it is anticipated that backups resulting from the lane closure might extend through the highway-rail grade crossing, the temporary traffic control zone should be extended so that the transition area precedes the highway-rail grade crossing. Early coordination with the railroad company should occur before work starts.



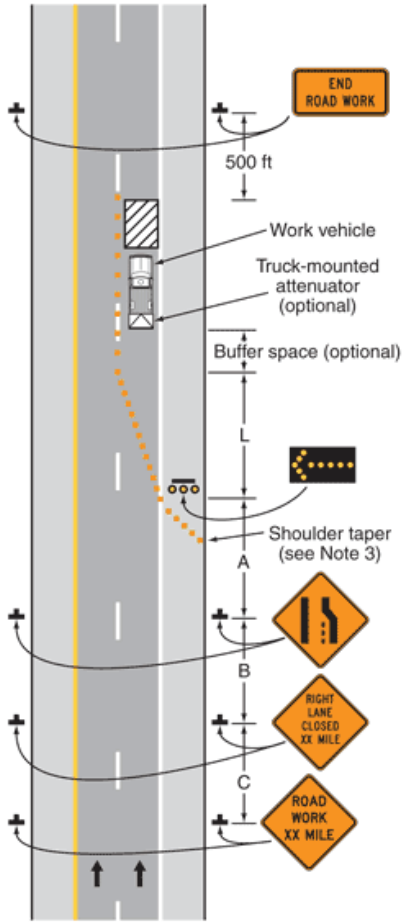
## **Lane Closure on Divided Highway (Short Term) (TA-33)**

This information also shall be used when work is being performed in the lane adjacent to the median on a divided highway. In this case, the LEFT LANE CLOSED signs and the corresponding LANE ENDS signs shall be substituted. When a side road intersects the highway within the temporary traffic control zone, additional temporary traffic control devices shall be placed as needed.

All vehicles, equipment, workers and their activities should be restricted to one side of the pavement. A truck-mounted attenuator may be used on the work vehicle and/or shadow vehicle.

*(See Illustration on Next Page)*

# Lane Closure on Divided Highway (Short Term) (TA-33)



**B - SHORT-TERM**

## **Mobile Operation on Multilane Road (TA-35)**

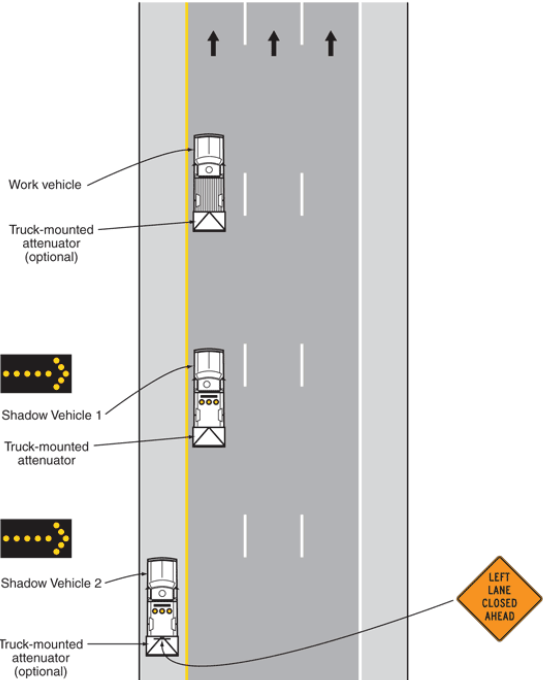
Arrow boards shall, as a minimum, be 60 x 30 inches. Vehicles used for these operations should be made highly visible with appropriate equipment, such as: rotating lights, strobe lights, flags, signs, or arrow boards.

Shadow Vehicle 1 should be equipped with an arrow board and truck-mounted attenuator. Shadow Vehicle 2 should be equipped with an arrow board. An appropriate lane closure sign should be placed on Shadow Vehicle 2 so as not to obscure the arrow board. Shadow Vehicle 2 should travel at a varying distance from the work operation so as to provide adequate sight distance for motor vehicle traffic approaching from the rear. The spacing between the work vehicles and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between. Work should normally be accomplished during off-peak hours.

When the work vehicle occupies an interior lane (a lane other than the far right or far left) of a directional roadway having a right shoulder 10 feet or more in width, Shadow Vehicle 2 should drive the right shoulder with a sign indicating that work is taking place in the interior lane.

*(See Illustration on Next Page)*

# Mobile Operation on Multilane Road (TA-35)



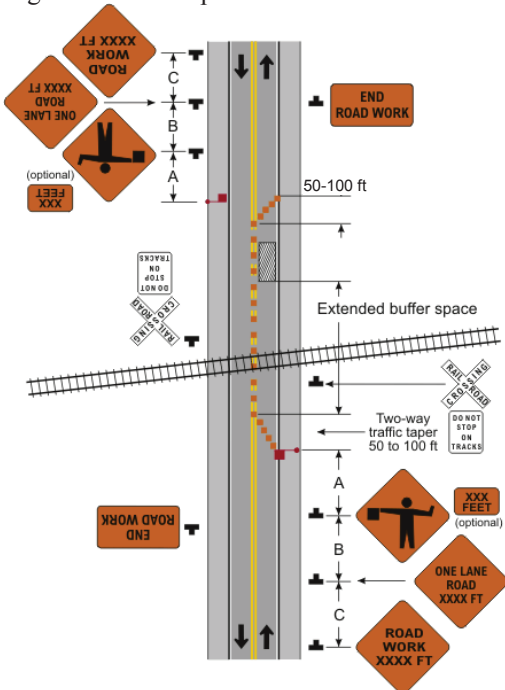
Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.



## Work in Vicinity of Highway-Rail Grade Crossing (TA-46)

When highway-rail grade crossings exist either within or in the vicinity of roadway work activities, extra care should be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing, considered as being 15 feet on either side of the closest and farthest rail.

If the queuing of vehicles across active rail tracks cannot be avoided, a law enforcement officer or flagger shall be provided at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing (as described above) even if automatic warning devices are in place.





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