

Guidelines for TRAFFIC TEMPORARY CONTROL



Oklahoma Department of Transportation
Traffic Engineering Division

Guidelines for Temporary Traffic Control (TTC)

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Introduction

The primary function of temporary traffic control (TTC) is to provide for the safe and efficient movement of vehicles, bicyclists, and pedestrians (including persons with disabilities in accordance with the Americans with Disabilities Act) through or around TTC zones while reasonably protecting workers and equipment. A concurrent objective of 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 2003 MUTCD. It is directed to any entity working on a roadway open to public travel. This handbook contains the basic principles of TTC, a description of the standard TTC devices, guidelines for the application of these devices, and typical application diagrams. Information concerning proper flagging along with the installation and maintenance of TTC devices is also presented.

The typical application diagrams shown represent minimum requirements for typical situations. They are not intended as substitutes for engineering judgement and should be altered to fit the conditions of a particular site - keeping in mind that all traffic control devices used must be in compliance with Part 6 of the MUTCD.

Major Temporary Traffic Control Considerations

Every TTC zone situation is different so several items must be considered in determining the traffic control 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 3 days.
 - Intermediate-term stationary: Work that occupies a location more than 1 daylight period 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 1 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 roadway 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 channelizing devices or an arrow panel needed for traffic channelization?
10. Will a flagger be required?

Fundamental Principles

The needs and control of all road users through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of the traffic incidents.

The principles which have been shown to enhance the safety in the vicinity of TTC zones include the following:

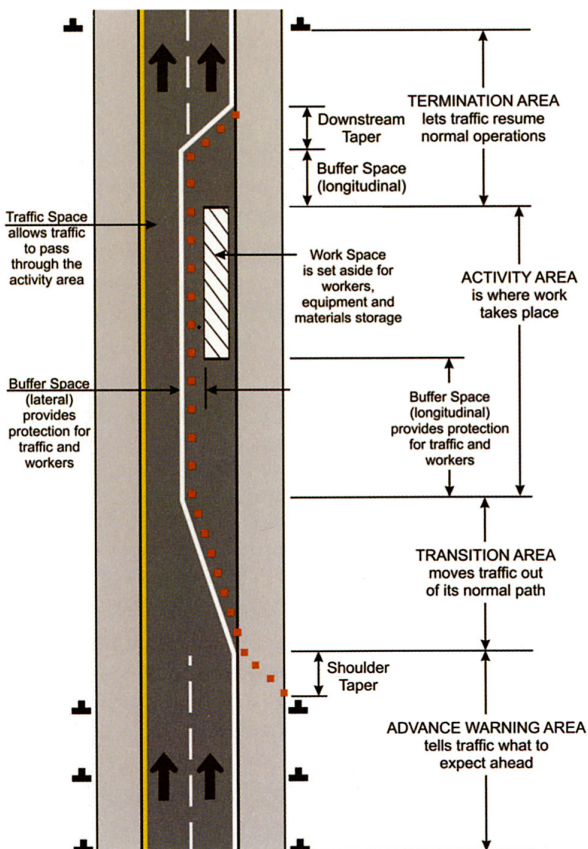
1. Safety and accessibility of road users and workers in TTC zones should be an integral and high-priority element of every project from planning through design and construction.
2. General plans or guidelines should be developed to provide safety for motorists, bicyclists, pedestrians, workers, enforcement/emergency officials, and equipment.
3. Road user movement should be inhibited as little as practical.
4. Motorists, bicyclists, and pedestrians should be guided in a clear and positive manner while approaching and traversing TTC zones and incident sites.
5. Routine day and night inspections should be performed to ensure acceptable levels of operations.
6. Attention should be given to the maintenance of roadside safety during the life of the TTC zone.
7. Each person whose actions affect TTC zone safety should receive training appropriate to the job decisions each individual is required to make.
8. Good public relations should be maintained.

Before any new detour or temporary route is opened to traffic, all necessary signs shall be in place.

All TTC devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, TTC devices that are no longer appropriate shall be removed.

Component Parts of a Temporary Traffic Control Zone

The TTC zone extends from the first advance warning sign to the END ROAD WORK sign or the last TTC device. Below is a diagram showing the areas in a TTC zone.



Tapers *(More detail in Table 3)*

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 a single lane before the end of the transition. A merging taper should have a length of L .

Shifting Taper

A shifting taper is used when a lateral shift is needed while maintaining the same number of lanes. A shifting taper should have a length of approximately $1/2 L$.

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 $1/3 L$.

Downstream Taper

A downstream taper may be useful in termination areas to provide a visual cue to the driver that access is available into the original lane or path that was closed. A downstream taper should have a length of approximately 100 feet per lane 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 maximum length of 100 feet with channelizing devices at approximately 20-foot spacings.

Flagging

Flaggers

A flagger should be trained in safe traffic control practices and public contact techniques and should demonstrate all the following abilities:

1. Receive and communicate specific instructions.
2. Move quickly to avoid danger from vehicles.
3. Control signaling devices to provide clear and positive guidance.
4. Understand and apply safe traffic control practices in stressful or emergency situations.
5. Recognize dangerous traffic situations and warn workers in sufficient time to avoid injury.

The flaggers must be clearly visible to approaching traffic. This can be accomplished by wearing high visibility clothing and staying clear of other workers or devices.

High Visibility Clothing

For daytime and nighttime work, flaggers shall wear ISEA/ANSI Class 2 or higher apparel. The apparel background material shall be either fluorescent orange-red or fluorescent yellow-green. 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 and SLOW provides road users with more positive guidance than flags and should be the primary hand-signaling device. Flags should only be used in emergencies.

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 semirigid material. The background of the STOP face shall be red with white letters and border. The background of the SLOW face shall be orange with black letters and border. When used at night, the STOP/SLOW paddle shall be retroreflectorized.

Flags, when used, shall meet the requirements of MUTCD Section 6E.03.

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 before entering the work space. Guidelines are shown in Table 3. The distance shown may be increased for downgrades and other conditions that affect stopping distances.

Except in emergencies, flaggers stations shall be preceded by advance warning signs and shall be illuminated at night.

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, by radio, or with audible warning devices such as horns, whistles, etc.) of approaching danger by out-of-control vehicles. The flagger should stand alone, never permitting a group of workers to congregate around the flagger station.

As a spot constriction, the flagger may have to take a position on the shoulder opposite the closed section in order to operate effectively. Table 3 may be used to determine the visibility distance required for road users approaching the flagger. At spot lane closures where adequate sight distance is available for the safe handling of traffic, the use of one flagger may be sufficient.

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 of 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. To further alert of slow traffic, the flagger holding the SLOW paddle face toward road users may motion up and down with the free hand, palm down.

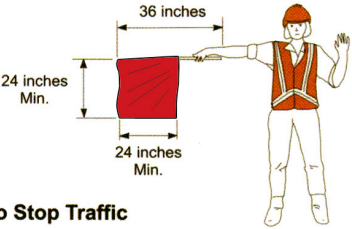
When signaling with a flag, the procedures in the MUTCD, Section 6E.04 shall be used.

The use of the STOP/SLOW paddle and the flag are shown in the following illustration.

**PREFERRED METHOD
STOP/SLOW PADDLE**



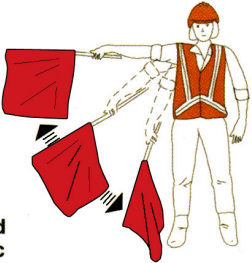
**EMERGENCY SITUATIONS ONLY
RED FLAG**



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. An official car that follows the last road user proceeding through the section.
3. A pilot car to guide a queue of vehicles through the temporary traffic control zone or detour. The pilot car shall have a sign (PILOT CAR FOLLOW ME) mounted on the rear of the vehicle.

Warning Lights

When required, 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 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 and D 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. ANSI/ISEA Class 2 or 3 apparel should be considered for all workers exposed to the risk of moving roadway traffic or construction equipment. Cones shall be equipped with retroreflective collars when used at night.

Arrow Panels

Flashing arrow panels 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 inches with at least 12 panel lamps to provide a minimum legibility distance of 1/2 mile. Arrow panels shall be equipped with a dimming device capable of 50 percent dimming for use at night. If a bulb matrix arrow panel is used, elements should be recess-mounted or equipped with an upper hood of at least 180 degrees. The only permissible use of an arrow panel on a two-lane, two-way roadway is the caution mode.

An arrow panel 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 TTC zone.

An arrow panel should be used in combination with appropriate signs, channelizing devices, or other TTC devices. An arrow panel should be placed on the shoulder of the roadway or, if practical, further from the traveled lane. It should be delineated with retroreflective TTC devices. When an arrow panel 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 TTC devices.

Note: Review and understand the full text of Section 6F.56 of the MUTCD prior to implementing a TTC plan using Arrow Panels.

OPERATING MODE

PANEL DISPLAY (Type C Panel Illustrated)

- I. One of the three following modes shall be provided:

Flashing Arrow



Move/Merge Right

Sequential Arrow



Move/Merge Right

Sequential Chevron



Move/Merge Right

- II. The following mode shall be provided:

Flashing Double Arrow



Move/Merge Right or Left

- III. One of the three following modes shall be provided:

Flashing Four Corners



Caution

Flashing Bar



Caution

Alternating Diamond



Caution

Channelizing Devices

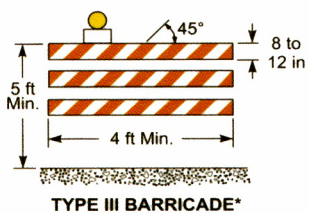
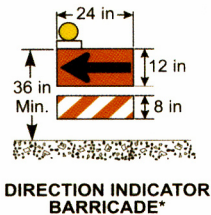
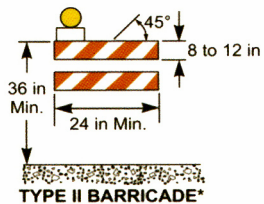
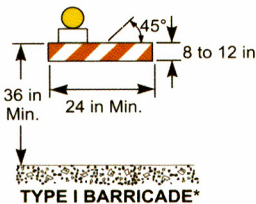
The function of channelizing devices is to warn road users of conditions created by work activities in or near the roadway and to guide them.

Channelizing devices should be crashworthy. The spacing of channelizing devices should not exceed a distance in feet equal to 1 times the speed limit (mph) when used for taper channelization and a distance in feet equal to 2 times the speed limit (mph) when used for tangent channelization (See Table 2)

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

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

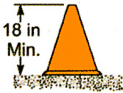
• BARRICADES



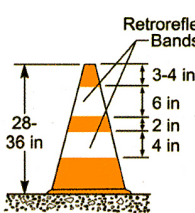
Note: If barricades are used to channelize pedestrians, there shall be continuous detectable bottom and top rails with no gaps between individual barricades to be detectable to users of long canes. The bottom of the bottom rail shall be no higher than 6 inches above the ground surface. The top of the top rail shall be no lower than 36 inches above the ground surface.

* Rail strips shall be 6 inches, except 4 inch stripes may be used if rail lengths are less than 36 inches.

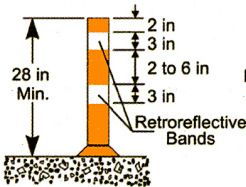
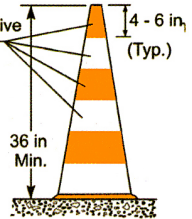
• CONES



Day and Low-Speed
Roadway (≤ 40 mph)

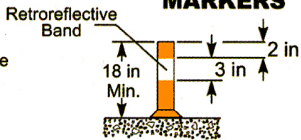


Night and/or Freeway
High-Speed Roadway
(≥ 45 mph)



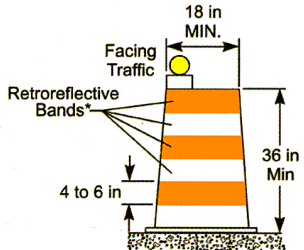
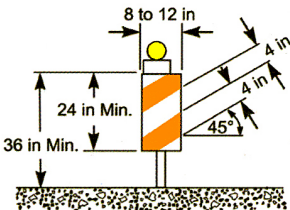
Night and/or Freeway
High-Speed Roadway
(≥ 45 mph)

• TUBULAR MARKERS



Day and Low-Speed
Roadway (≤ 40 mph)

• VERTICAL PANEL



• DRUMS

Note: If drums, cones, or tubular markers are used to channelize pedestrians, they shall be located such that there are no gaps between the bases of the devices, in order to create a continuous bottom, and the height of each individual drum, cone, or tubular marker shall be no less than 36 inches to be detectable to users of long canes.

* Retroreflective bands on cones that are more than 36 inches in height and on drums shall be provided by horizontal, circumferential alternating orange and white retroreflective stripes that are 4 to 6 inches wide. Each shall have a minimum of two orange and two white stripes, with the top stripe being orange. Any nonretroreflective spaces between the orange and white stripes shall not exceed 3 inches in width.

Signs

TTC zone signs convey both general and specific messages by means of words or symbols and have the same three categories as all road user signs: regulatory, warning, and guide.

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

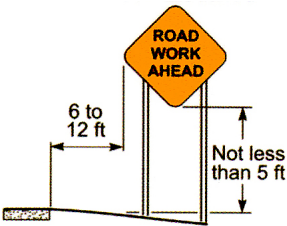
Size

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. Deviation from standard sizes shall be in 6-inch increments.

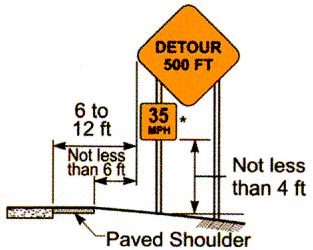
Sign Placement

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. Both fixed and portable sign supports shall be crashworthy, and neither portable nor permanent sign supports should be located on sidewalks, bicycle lanes, or areas designated for pedestrian or bicycle traffic.

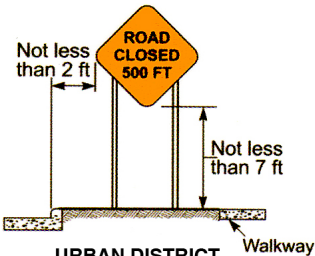
Signs mounted on portable supports should not be used for a duration of more than 3 days except the closure and detour signs typically mounted on barricades. Guidelines for height and lateral clearance of temporary post-mounted signs are shown below.



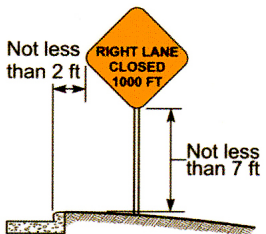
RURAL DISTRICT



**RURAL DISTRICT WITH
ADVISORY PLAQUE**



URBAN DISTRICT



URBAN DISTRICT

* Advisory speed should be determined by authority in charge of highway or street.

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.

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 for sign spacing are presented in the summary of layout dimensions below. See typical application diagrams for sign layout.

Summary of Layout Dimensions

Table 1 - sign spacing

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

On lower speed rural highways, an acceptable alternative spacing between warning signs (in feet) is 8 to 12 times the speed limit (in mph).

Table 2 - Channelizing Device Spacing

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

Summary of Layout Dimensions (continued)

Table 3 - Tapers and Flagger Station

Speed (S) (in MPH)	Flagger Station or Buffer (in feet)	*Merging Taper Length "L" (in feet)			Channelizing Device Spacing (in feet)		
		10 ft. lane	11 ft. lane	12 ft. lane	Taper	Buffer Space	Work Space
20	115	65	75	80	20	40	40
25	155	105	115	125	25	50	50
30	200	150	165	180	30	60	60
35	250	205	225	245	35	70	70
40	305	265	295	320	40	80	80
45	360	450	495	540	45	90	90
50	425	500	550	600	50	100	100
55	495	550	605	660	55	110	110
60	570	600	660	720	60	120	120
65	645	650	715	780	65	130	130
70	730	700	770	840	70	140	140

- * For shifting taper, divide by 2.
For shoulder taper, divide by 3.
















Downstream Taper = 100 ft per lane
1-lane, 2-way taper (flagger) = 100 ft. maximum

For other widths, use the following formulas to calculate merging taper length:

If S is 40 mph or less, $L = W \times S \times S / 60$
If S is 45 mph or more, $L = W \times S$

Typical Application Diagrams

The diagrams on the following pages represent examples of application principles and procedures for safe and efficient TTC in work zones. The layouts represent minimum requirements. It is not possible to illustrate every situation which will require work area protection. These 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 and Table 3 for more specific information on taper lengths. For further information, refer to the MUTCD Part 6.

	Arrow panel		Sign (Shown facing left)
	Arrow panel support or trailer		Surveyor
	Channelizing device		Truck mounted attenuator
	Crash Cushion		Type III Barricade
	Direction of traffic		Warning lights
	Direction of temporary traffic detour		Work space
	Flagger		High level warning device (Flag tree)
			Work vehicle

Standard Notes for all Typical Application Diagrams

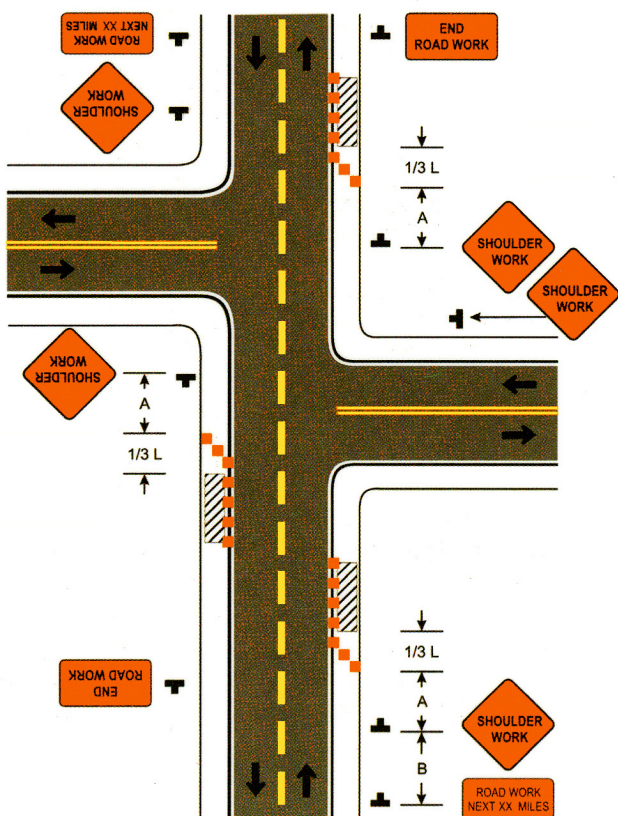
The following general notes apply to a typical application diagrams:

- Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotation, flashing, oscillating, or strobe lights.
- At night, flagger stations shall be illuminated, except in emergencies when it is not feasible.
- When used, the BE PREPARED TO STOP sign should be located before the flagger symbol sign.

Work on Shoulders (TA-3)

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

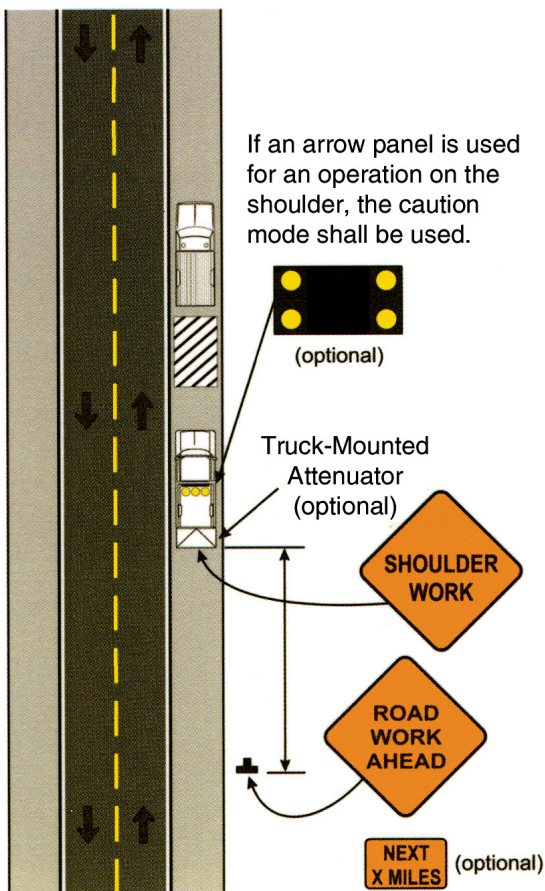
When paved shoulders having a width of 8 feet or more are closed, at least one advance warning sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.



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

When multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance warning sign and the work should not exceed 5 miles.

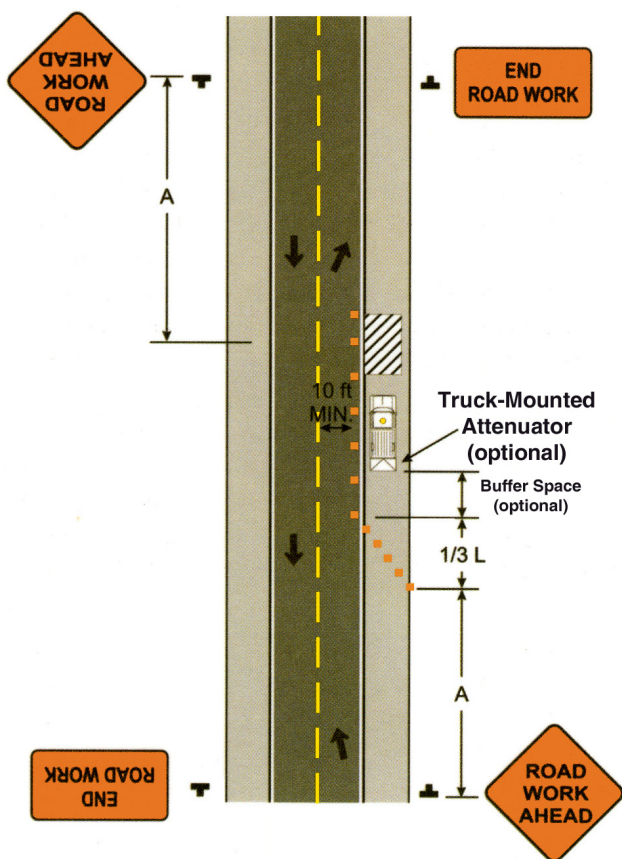
When the distance between the advance signs and the work is 2 to 5 miles, a Supplemental Distance plaque should be used with the ROAD WORK AHEAD sign.



Shoulder Work with Minor Encroachment (TA-6)

All lanes should be minimum of 10 feet 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.



Road Closure with Diversion (TA-7)

Devices similar to those depicted shall be placed for the opposite direction of travel.

Pavement markings no longer applicable shall be removed or obliterated as soon as practicable.

Temporary barriers and end treatments shall be crashworthy.

If the tangent distance along the temporary diversion is more than 600 feet, a Reverse Curve sign, left first, should be used instead of the Double Reverse Curve sign, and a second Reverse Curve sign, right first, should be placed in advance of the second reverse curve back to the original alignment.

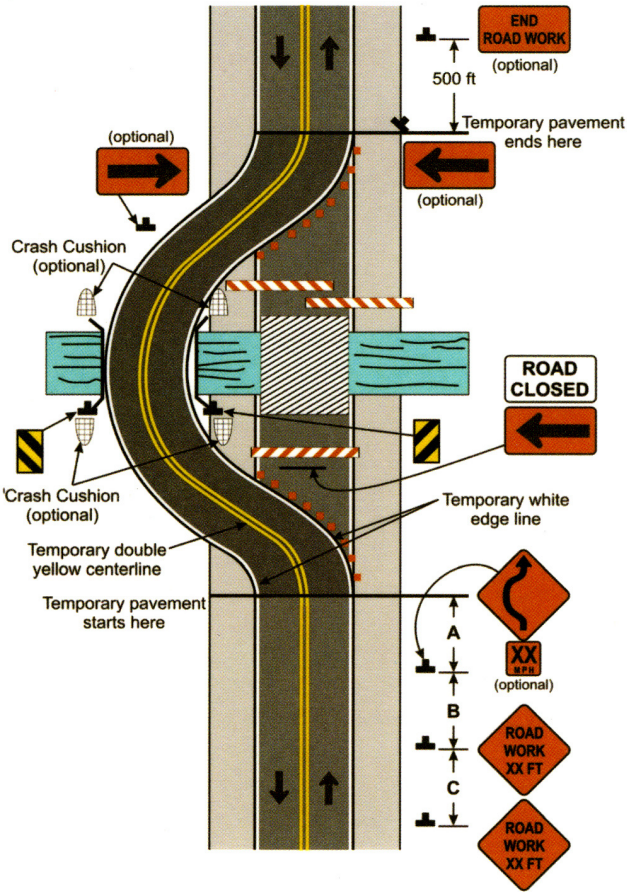
When the tangent section of the diversion is more than 600 feet, and the diversion has sharp curves with recommended speeds of 30 mph or less, Reverse Turn signs should be used.

Where the temporary pavement and old pavement are different colors, the temporary pavement should start on the tangent of the existing pavement and end on the tangent of the existing pavement.

(See Illustration Below)

Road Closure with Diversion (TA-7)

(Continued from notes above)



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

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.

When a highway-rail grade crossing exists within or upstream of the transition area and it is anticipated that queues resulting from the lane closure might extend through the highway-rail grade crossing, the TTC 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.

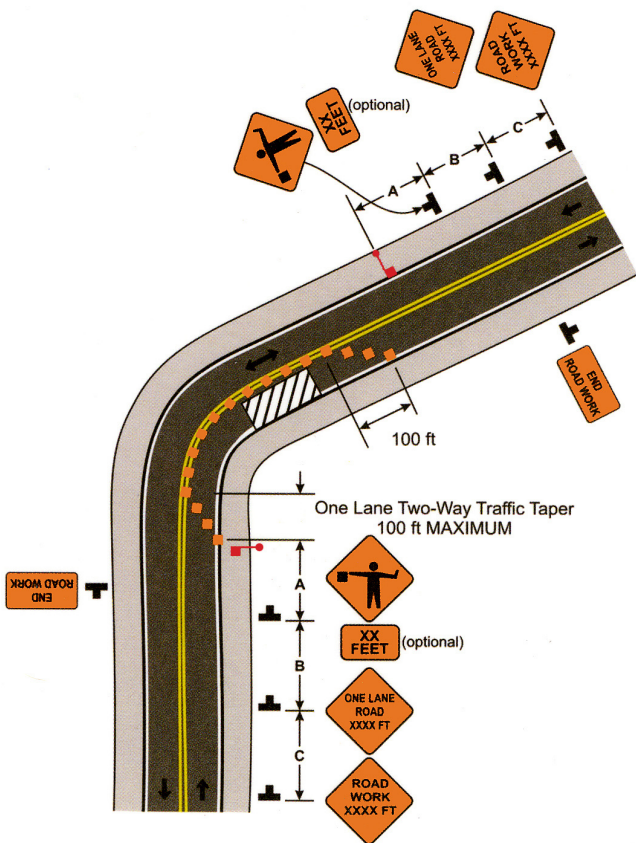
When a highway-rail grade crossing exists within the activity area, drivers operating on the left side of the normal centerline should be provided with comparable warning devices as for drivers operating on the right side of the normal centerline.

Early coordination with the railroad company should occur before work starts.

(See Illustration Below)

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

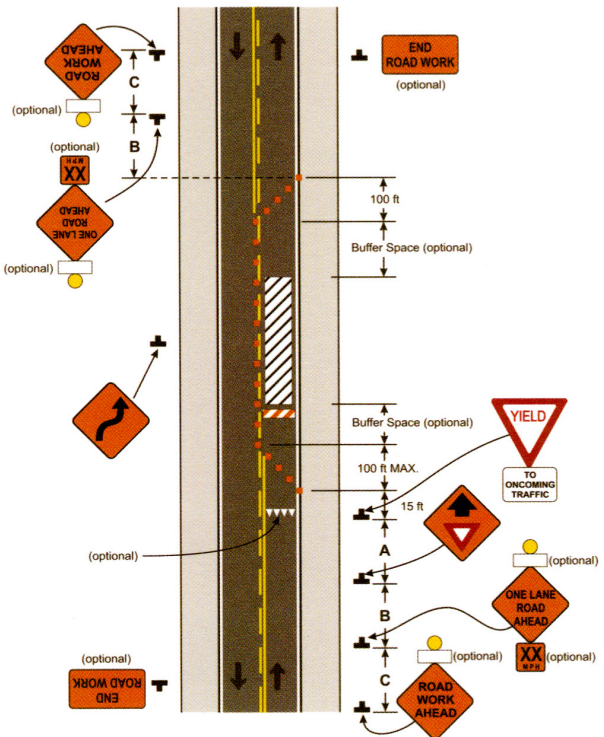
(Continued from notes above)



Lane Closure on Two-Lane Road with Low Traffic Volumes (TA-11)

This TTC zone application may be used as an alternate to TA-10 when both of the following conditions exist:

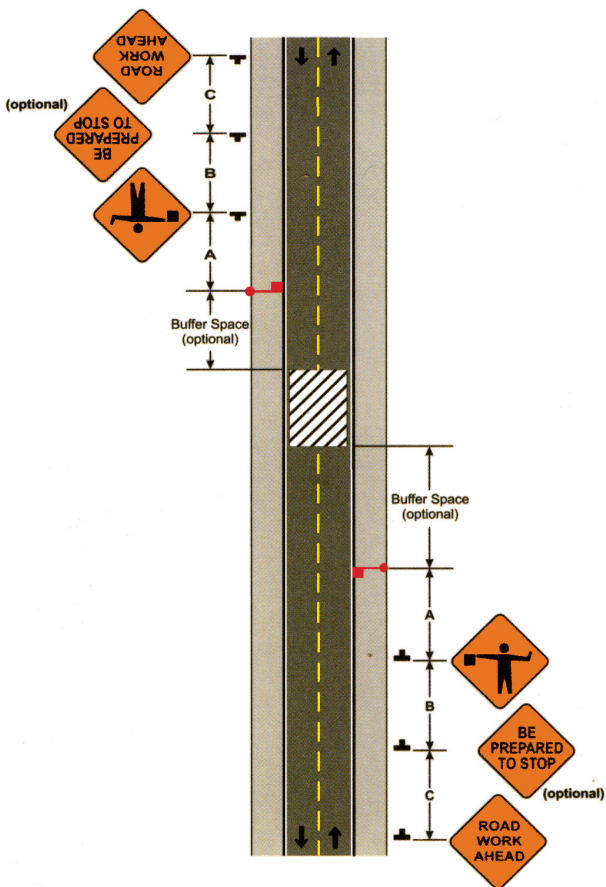
- Vehicular traffic volume is such that sufficient gaps exist for vehicular traffic that must yield.
- Road users from both directions able to see approaching vehicular traffic through and beyond the work site and have sufficient visibility of approaching vehicles.



Temporary Road Closure (TA-13)

Conditions represented are a planned closure not exceeding 20 minutes during the daytime.

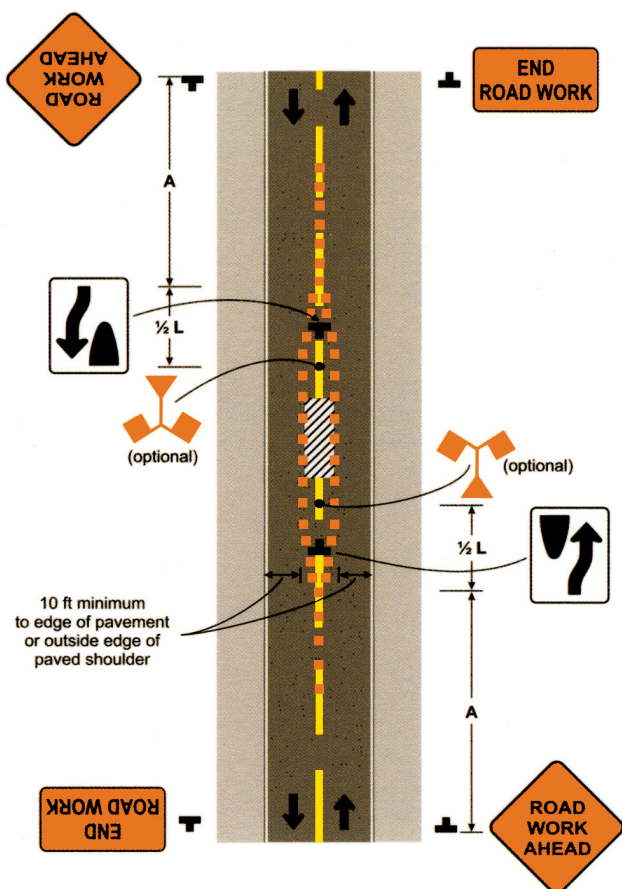
A flagger or uniformed law enforcement officer shall be used for this application. A flagger shall (and an officer should) follow the procedures noted in MUTCD Sections 6E.04 and 6E.05.



Work in Center of Road with Low Traffic Volumes (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.

Workers in the roadway should wear high-visibility safety apparel as described in MUTCD Section 6D.03.



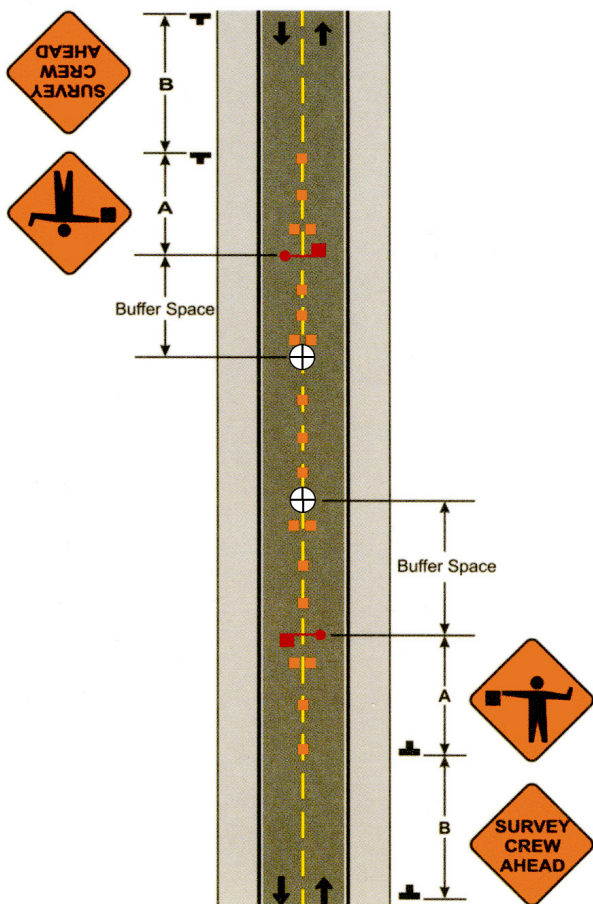
Surveying Along Roadway Centerline (TA-16)

For surveying on the centerline of a high-volume road, one lane shall be closed using the information illustrated in TA-10.

A flagger should be used to warn workers who cannot watch road users.

Workers in the roadway should wear high-visibility safety apparel as described in MUTCD Section 6D.03.

Cones should be placed 6 to 12 inches on either side of the centerline.



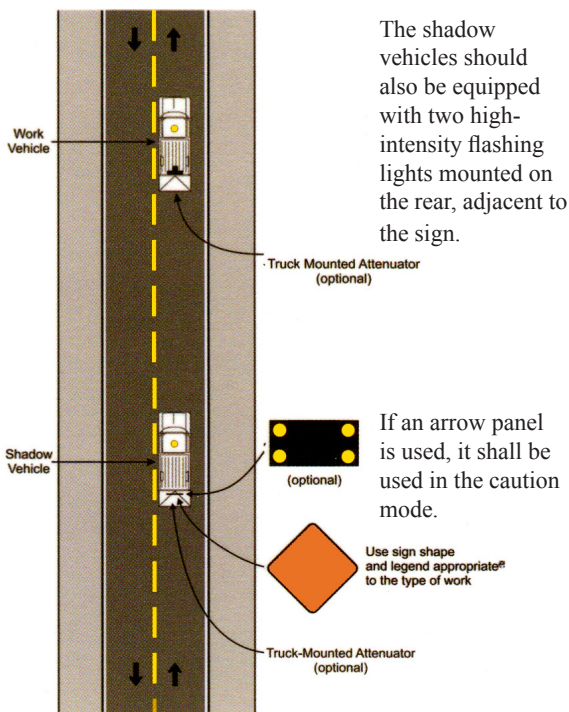
Mobile Operations on Two-Lane Road (TA-17)

Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.

Shadow and work vehicles shall display high-intensity rotation, flashing, oscillating, or strobe lights.

Where practical and when needed, the work and shadow vehicles should pull over periodically to allow vehicular traffic to pass.

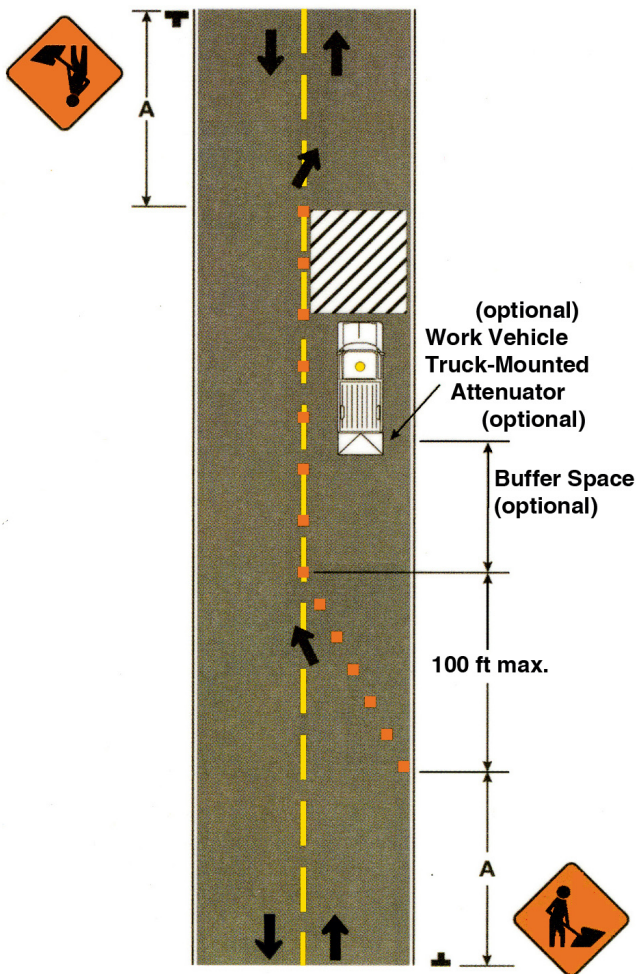
Whenever adequate stopping sight distance exists to the rear, the shadow vehicle should maintain the minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should slow down in advance of vertical or horizontal curves that restrict sight distance.



Lane Closure on Minor Street (TA-18)

This TTC shall be used only for low-speed facilities having low traffic volumes.

Where vehicular traffic cannot effectively self-regulate, one or two flaggers shall be used as illustrated in TA-10,

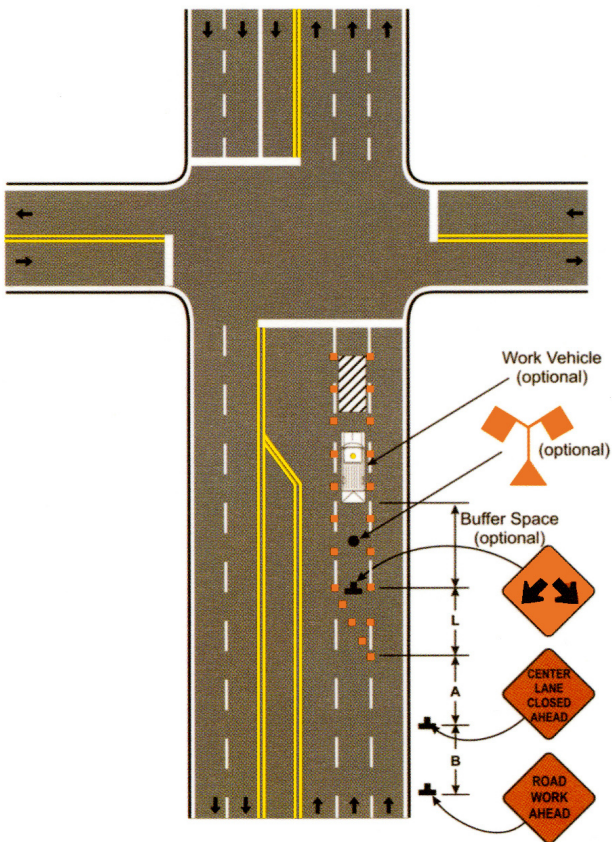


Lane Closure on Near side of Intersection (TA-21)

The merging taper shall direct vehicular traffic into either the right or left lane, but not both.

In this typical application, a left taper should be used so that right-turn movements will not impede through motor vehicle traffic. However, the reverse should be true for left-turn movements.

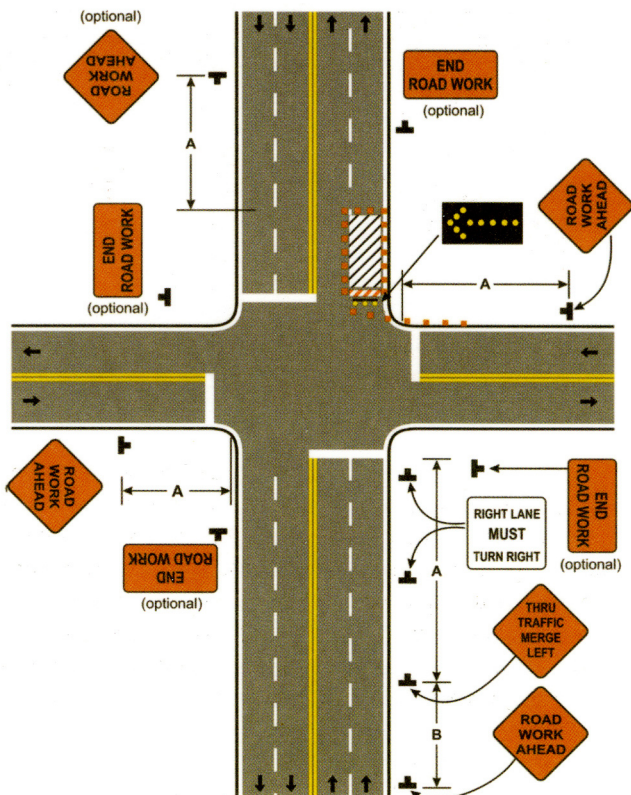
If the work space extends across a crosswalk, the crosswalk should be closed (see MUTCD, Figure 6H-29).



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

If the work space extends across a crosswalk, the crosswalk should be closed (see MUTCD, Figure 6H-29).

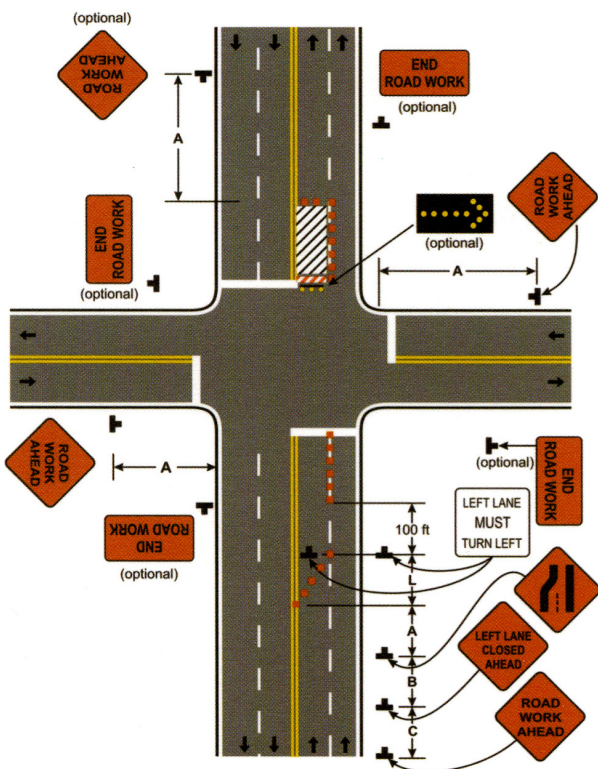
The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a right lane having significant right turning movements, then the right lane may be restricted to right turns only, as shown. This procedure increases the through capacity by eliminating right turns from the open through lane.



Left Lane Closure on Far Side of Intersection (TA-23)

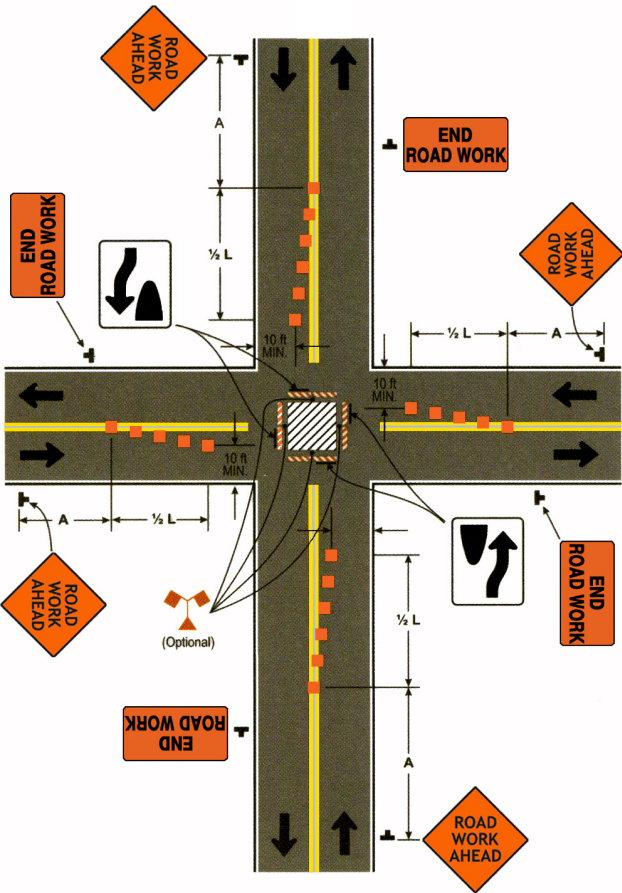
If the work space extends across a crosswalk, the crosswalk should be closed (see MUTCD, Figure 6H-29).

The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a left lane having significant left-turning movements, then the left lane may be reopened as a turn bay for left turns only, as shown.



Closure in Center of Intersection (TA-26)

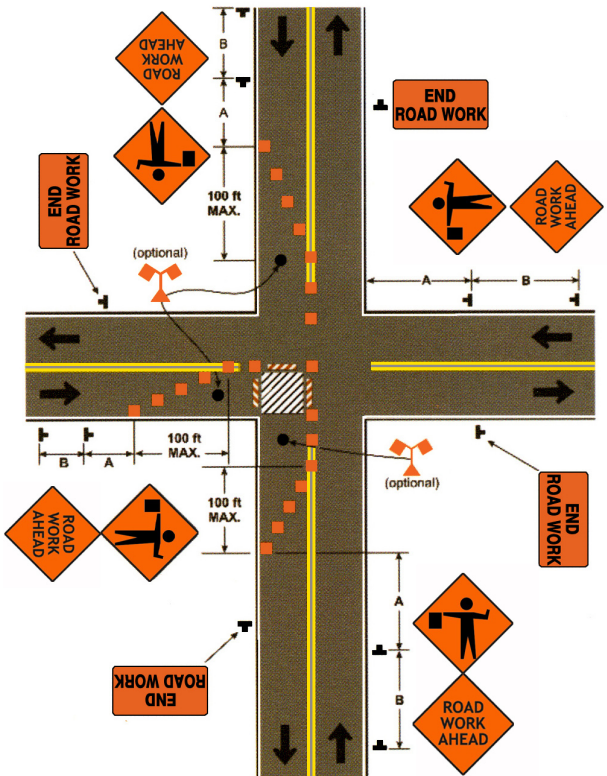
All lanes should be a minimum of 10 feet in width as measured to the near face of the channelizing devices.



Closure at Side of Intersection (TA-27)

The situation depicted can be simplified by closing one of more of the intersection approaches. If this cannot be done, and/or when capacity is a problem, through vehicular 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.

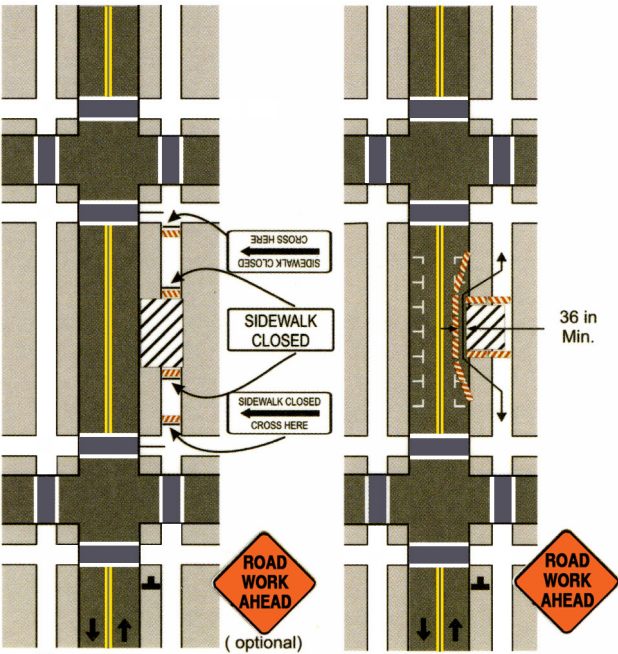


Sidewalk Detour or Diversion (TA-28)

When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and include accessibility features consistent with present features in the existing pedestrian facility.

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

Audible information devices should be considered where midblock closings and changed crosswalk areas cause inadequate communication to be provided to pedestrians who have visual disabilities.



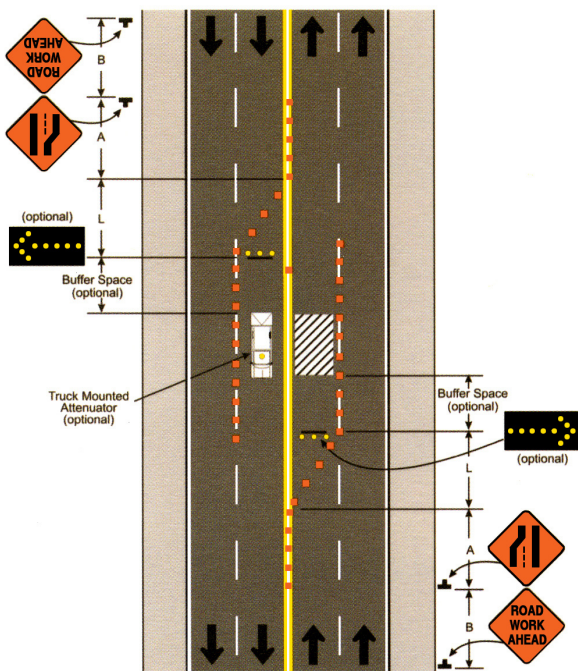
SIDEWALK DETOUR

SIDEWALK DIVERSION

Interior Lane Closure on Multi-lane 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 FT should be used between the signs shown.

When a highway-rail grade crossing exists within or upstream of the transition area and backups resulting from the lane closure might extend through the highway-rail grade crossing, the TTC zone should be extended so that the transition area precedes the crossing. Early coordination with the railroad company should occur before work starts.



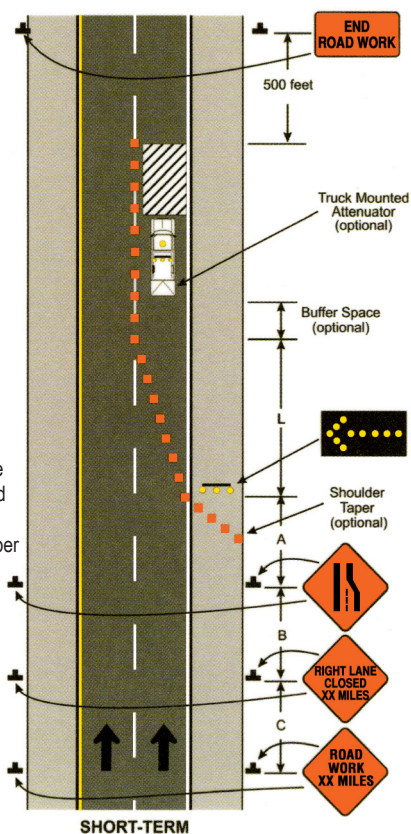
Stationary Lane Closure on Divided Highway (TA-33)

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 paved shoulders having a width of 8 feet or more are closed, channelizing devices should be used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within the traveled way.

For long-term or intermediate-term work:

- A temporary white edge line is required
- A downstream taper may be added



Mobile Operation on Multi-lane Road (TA-35)

Arrow panels shall, as a minimum, be Type B with a size of 60 x 30 inches.

Vehicles used for these operations should be made highly visible with appropriate equipment, such as: high-intensity rotation, flashing, oscillating, or strobe lights, flags, signs, or arrow panels.

Shadow Vehicle 1 should be equipped with an arrow panel and truck-mounted attenuator.

Shadow Vehicle 2 should be equipped with an arrow panel. An appropriate lane closure sign should be placed on Shadow Vehicle 2 so as not to obscure the arrow panel.

Shadow Vehicle 2 should travel at a varying distance from the work operation so as to provide adequate sight distance for vehicular 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.

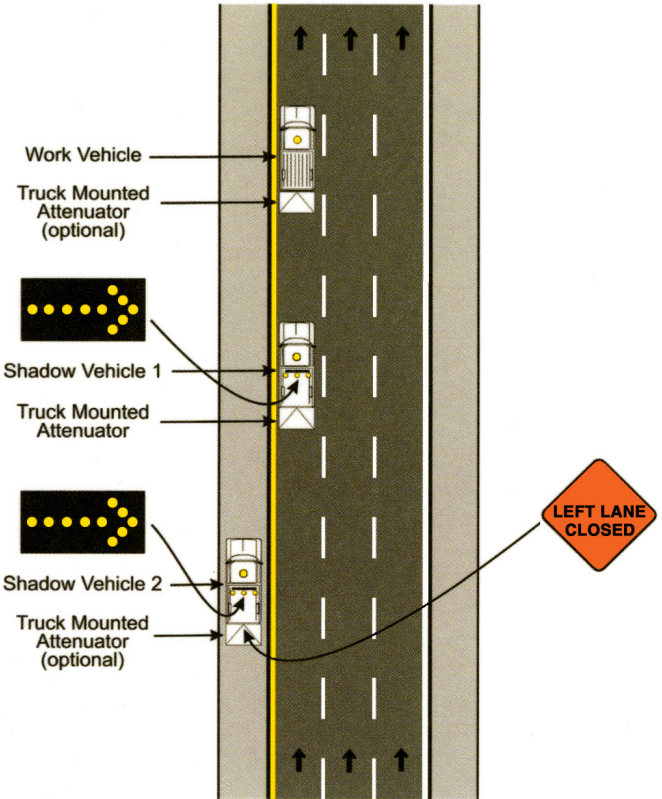
Work should normally be accomplished during off-peak hours.

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 Below)

Mobile Operation on Multi-lane Road (TA-35)

(Continued from notes above)



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

When highway-rail grade crossings exist near the 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 uniformed 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, even if automatic warning devices are in place.

Early coordination with the railroad company should occur before work starts.

In the example depicted, the buffer space of the activity area should be extended upstream of the highway-rail grade crossing (as shown) so that a queue created by the flagging operation will not extend across the highway-rail grade crossing.

The DO NOT STOP ON TRACKS sign should be used on all approaches to a highway-rail grade crossing within the limits of a TTC zone.

(See Illustration Below)

(Continued from notes above)



TTC Zone Checklist

Project: _____ Inspector's Name _____

Date: _____ Time of Day: _____

Overall appearance of TTC Zone _____

A. DRIVE THRU

- Maneuvers easy to follow?
- Adequate warnings of hazards?
- Signing clear?
- Traffic control devices sufficiently visible?
- Consistent with traffic control plan?
- Comments: _____

B. SIGNS

- Need to be removed/repositioned/covered?
- Need to be cleaned/replaced?
- Need additional signs?
- Existing signs need to be covered?
- Sign supports crashworthy?
- Adequate retroreflectivity?
- Correct size?
- Correct spacing?
- Consistent with traffic control plan?
- Comments: _____

C. CHANNELIZING DEVICES

- Adequate taper length?
- Device spacing?
- Need for additional devices?
- In need of repair/cleaning/replacement?
- Adequate retroreflectivity?
- Consistent with traffic control plan?
- Comments: _____

D. ARROW PANELS

- All elements burning?
- Placement?
- Alignment?
- Capable of dimming?
- Consistent with traffic control plan?
- Comments: _____

E. PAVEMENT MARKINGS

- Conflicting markings?
- Retroreflective?
- Proper width and length?
- Comments: _____

F. FLAGGING

- High visibility clothing?
- Positioned appropriately?
- Proper equipment?
- Professional behavior?
- Comments: _____

Corrective action required?

Urgent? _____ **Within 3 days?** _____ **Within** _____ **days?**

Comments: _____

Signed: _____

Acknowledgments

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Oklahoma Department of Transportation

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