



Maricopa County

Department of Transportation

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Date: September 1, 2015

To: Agency, Consultants, Contractors, Engineers, and Department Staff

From: Jennifer Toth, P.E.
Director/County Engineer

Subject: 2015 MCDOT Traffic Control Manual: Work Zone and Special Events

Effective September 1, 2015 work performed within Maricopa County right-of-way shall comply with the Maricopa County Department of Transportation (MCDOT) Traffic Control Manual: Work Zone and Special Events. This comprehensive manual shall supersede all previous memoranda and both written and unwritten guidelines for traffic control. The attached manual shall remain in effect until reissued or updated. Please address any specific concerns to:

Nicolaas Swart, P.E., Transportation Systems Management Division Manager
(602) 506-0599 (email: NicolaasSwart@mail.maricopa.gov)

The manual is available on the MCDOT website
<http://www.mcdot.maricopa.gov/technical/home.htm>

or for purchase at MCDOT's Customer Service counter:

2901 West Durango Street
Phoenix, Arizona 85009
(602) 506-8600



Jennifer Toth, P.E.,
Director/County Engineer

09/01/2015

Date

Table of Contents

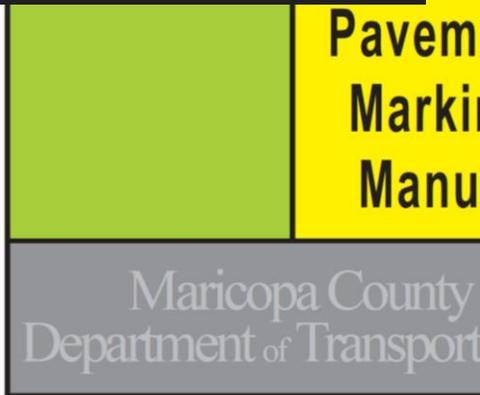
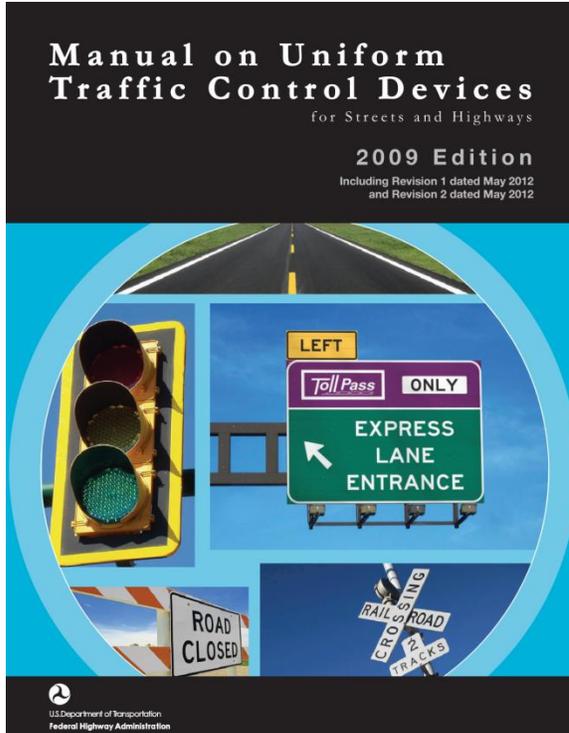
Chapter.....	Pages
Table of Contents	i
1. Purpose, Authorization, and References	1-1
1.1. Background	1-1
1.2. Purpose	1-1
1.3. References	1-2
2. Traffic Control Plan Requirements.....	2-1
2.1. Plan Requirements.....	2-1
2.2. Temporary Traffic Control.....	2-2
3. Plan Review/ Approval Process.....	3-1
3.1. County Maintenance and Operations.....	3-1
3.2. Transportation Improvement Projects	3-1
3.3. Work under Permit in MCDOT Right-of-Way.....	3-1
3.4. Special Events.....	3-2
4. General Traffic Control and Safety Guidelines.....	4-1
4.1. General Traffic Regulations.....	4-1
4.1.1. Advance Notification to MCDOT	4-1
4.1.2. Traffic Restrictions	4-1
4.1.3. Special Requirements for Work near Traffic Signals.....	4-2
4.1.4. Local Access Requirements.....	4-2
4.1.5. Special Access Requirements to Protect Public Facilities	4-2
4.1.6. Special Pedestrian Accommodations.....	4-2
4.1.7. Special Event Coordination Requirements	4-3
4.1.8. Holiday Season Requirements	4-3
4.1.9. Coordination between Projects	4-3
4.1.10. Emergency Contact Information	4-3
4.1.11. Field maintenance of Traffic Control Plan	4-3
4.2. General Safety Guidelines.....	4-4
4.2.1. Worker Safety	4-4
4.2.2. How Service Vehicles can best be used to Promote Safety.....	4-6

5.	Special Event	5-1
5.1.	Special Events Definition.....	5-1
5.2.	Special Event Considerations	5-1
5.3.	Requirements.....	5-2
5.3.1.	Pre-Event Traffic Control Plan Meeting	5-2
5.3.2.	Permitting Process Summary	5-2
5.3.3.	Event Traffic Control	5-2
5.3.4.	Special Requirements.....	5-3
6.	Temporary Traffic Control Devices and Applications	6-1
6.1.	General Requirements	6-1
6.1.1.	Why Use Temporary Traffic Control Devices	6-1
6.1.2.	Removal of Temporary Traffic Control Devices When Not Applicable.....	6-1
6.1.3.	Channelization	6-1
6.1.4.	Work Zone Speed Limits	6-1
6.1.5.	Maintenance of Traffic Signs and Pavement Markings	6-2
6.1.6.	Temporary Traffic Signals.....	6-4
6.2.	Sign Applications	6-4
6.2.1.	Sign Sizes	6-4
6.2.2.	Sign Sheeting.....	6-5
6.2.3.	Sign Mounting Heights.....	6-5
6.2.4.	Sign Mounting Procedures and Placement.....	6-5
6.3.	Barricade and Channelization Applications	6-6
6.3.1.	Taper Lengths.....	6-6
6.3.2.	Barricades.....	6-7
6.3.3.	Barricade Warning Lights	6-8
6.3.4.	Channelizing Devices.....	6-9
6.3.5.	Arrow Boards	6-10
6.3.6.	Changeable Message Signs (CMS).....	6-10
6.4.	Pavement Marking Applications	6-12
6.5.	Portable Barrier Applications	6-12
7.	Uniformed Officers/ Flaggers.....	7-1
7.1.	General.....	7-1

7.2.	Police Control	7-1
7.3.	Flagger Control.....	7-2
7.3.1.	Flagging Procedures:.....	7-3
7.3.2.	Pilot Cars	7-3
7.4.	Intersection Restrictions.....	7-3
8.	Pedestrian Safety and Accommodations	8-1
8.1.	Special Pedestrian Considerations.....	8-1
8.2.	Closure of Pedestrian Facilities	8-1
9.	Sample Traffic Control Applications and Forms.....	9-1
9.1.	Sample Plans	9-1
9.2.	Forms	9-3
10.	Appendix A.....	10-1
10.1.	Sample Traffic Control Plans	10-1
11.	Appendix B.....	11-1
11.1.	Forms	11-1
11.1.1.	Form Instructions.....	11-1
11.1.2.	Forms	11-1

1.

Purpose, Authorization, and Reference



Roadway Design Manual

Adopted: November 3, 1993

Last Update: June 2015

Maricopa County
Department of Transportation
2901 W. Durango Street
Phoenix, AZ 85009



1. Purpose, Authorization, and References

1.1. Background

The current accepted version of the *Manual of Uniform Traffic Control Devices* (MUTCD) and the current Arizona Department of Transportation (ADOT) supplement are the legal standards for traffic control devices for all jurisdictions within Arizona. This is required per Arizona Revised Statutes (ARS) § 28-641 and § 28-643. Deviations from these guidelines, except during emergency conditions, must have prior approval of the County Engineer or his/her representative.

Per ARS § 28-641, the ADOT director shall adopt a manual and specifications for a uniform system of traffic control devices for use on highways in this state. Except as provided in ARS § 28-644, the uniform system shall correlate with and as close as possible conform to the system set forth in the most recent edition of the MUTCD for streets and highways prepared by the MUTCD national joint committee on uniform traffic control devices.

Local authorities in their respective jurisdictions shall place and maintain the traffic control devices on highways under their jurisdiction as they deem necessary to indicate and to carry out this chapter or local traffic ordinances or to regulate, warn or guide traffic. All traffic control devices erected shall conform to the manual and specifications prescribed in § 28-641.

1.2. Purpose

The purposes of the Maricopa County Department of Transportation (MCDOT) *Traffic Control Manual: Work Zone and Special Events* include:

- Document all County traffic-control related policies and procedures into a single comprehensive manual
- Ensure consistency in the application of traffic control policies and procedures by all parties performing work in the County right-of-way and thereby enhancing driver expectation(s) in work zones
- Ensure consistency in the application of traffic control policies and procedures by all parties engaging in special events which impact the County right-of-way and thereby enhancing driver expectation(s) in special event areas
- Include processes and procedures for work zone assessment and management that will standardize work zone safety and mobility practices that support decision-making during the different stages of program and project delivery (in compliance to implementing the Rule on Work Zone Safety and Mobility, Federal Highway Administration (FHWA) updated 23CFR 630 Subpart J, its regulation on work zone safety and mobility; the final rule was published in the Federal Register -- 69 FR 54562 -- on September 9, 2004).
- Address pre-planned work zone traffic management. Emergency traffic control will follow Chapter 6I of the MUTCD.

This manual is not meant to replace the MUTCD or the ADOT Supplement, but to address standard practices for MCDOT. In all cases, the Traffic Control Plan (TCP) should conform to, or be of higher standards than, the methods outlined in the above-mentioned publications.

1.3. References

The MCDOT ***Traffic Control Manual: Work Zone and Special Events*** complements other local and national manuals, including:

- ***Manual on Uniform Traffic Control Devices***, Federal Highway Administration, (current edition and any future updates thereto)
- ***ADOT Supplement to the Manual on Uniform Traffic Control Devices***, Arizona Department of Transportation (current edition and any future updates thereto)
- ***Pavement Marking Manual***, MCDOT (current edition and any future updates thereto)
- ***Traffic Signing Manual***, MCDOT (current edition and any future updates thereto)
- ***Roadway Design Manual***, MCDOT (current edition and future updates thereto)
- ***MCDOT Supplement to the Maricopa Association of Governments' Uniform Standard Specifications and Detail for Public Works Construction Specifications***, (current edition and future updates thereto)

The following questions or concerns arising from this manual shall be addressed to the Maricopa County Traffic Engineer or his designee for resolution or interpretation:

- Contradictions between this and the complementary manuals
- Relative precedence of these manuals
- Interpretations of the guidelines and procedures provided in this manual

2.

Traffic Control Plan Requirements

TRAFFIC CONTROL PLAN SUBMITTAL FORM
 Maricopa County Department of Transportation
 2901 W. Durango Street Phoenix, Arizona 85009

MCDOT Approval

Check One: First Review Re-submittal Date Change (include original approved TCP)

MCDOT Permit No. TC-_____

[Click Here to Print Form](#)

Burt Neptune (602) 506-2901 burtneptune@mail.maricopa.gov

John Counts (602) 506-4624 johncounts@mail.maricopa.gov

Mark Clark (602) 506-8324 MarkClark@mail.maricopa.gov

PLEASE PROVIDE THE FOLLOWING INFORMATION

MCDOT Project Number: _____ Date: _____ Page 1 of: _____

Work Location: _____ Main Cross Roads: _____

Direction(s) Affected: W/B E/B N/B S/B Full Road Closure Special Event

Contractor: _____ Office Phone: _____ Office Fax: _____

On-site Contact Name: _____ Phone #: _____ Email: _____

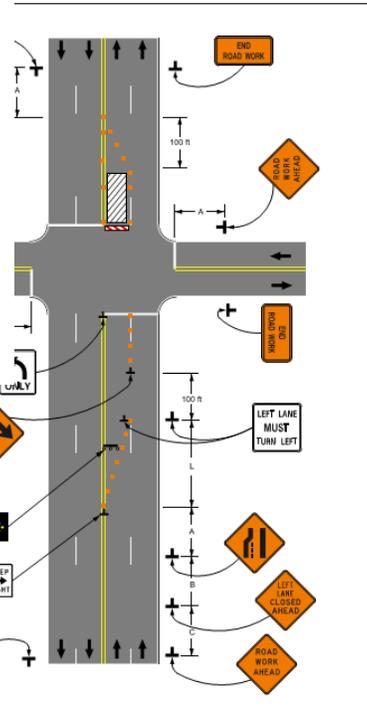
24 Hour Contact Name: _____ Phone #: _____ Email: _____

Barricade Company: _____ Office Phone: _____ Office Fax: _____

24 Hour Contact Name: _____ Phone #: _____ Email: _____

Work Start Date: _____ Work End Date: _____ Work Hours: _____

- MCDOT General Notes:**
- The contractor shall comply with the MCDOT Traffic Control Manual: Work Zone and Special Events, Manual for Uniform Traffic Control Devices (MUTCD), the Maricopa Association of Governments (MAG) Uniform Standard Specifications and Details for Public Works Construction and the MCDOT Supplement thereto.
 - The MCDOT Project Engineer or his/her representative has the authority to initiate field changes to assure public safety.
 - The Traffic Control Plan (TCP) shall include a detailed site plan showing project name, project number, north arrow, existing signing, existing striping, posted speed limits, road names, required traffic control devices, detours, tapers, pedestrian walkways, bike lanes, driveways/accesses, parking, construction fences, roadway jurisdictions and project phase of work, contact person's name and telephone number of the barricade company that is installing the traffic control devices. Indicate on the TCP the duration of the construction, work dates, hours, and phases of work.
 - Ten (10) working days notice is required for all Traffic Control Plan approvals.
- MCDOT Special Requirements:**
- Bump signs shall be installed for all steel plates in the roadway. Steel plates shall be flush with the surface on all paved roadways to cover hazards and restore normal traffic flows during non-work times.
 - The contractor shall maintain shoulder for dust control
- All construction signs and barricades shall be lighted if installed overnight.**
- Open trench signs shall be installed for any open trench or pit excavation.
 - Traffic control flaggers shall be certified, properly equipped and use slow/stop paddles not flags.
 - The contractor shall assist in the passage of any legal over-width vehicle through their construction zone.
 - Any shoulder detour longer than 5 days SHALL be paved 3-inches asphalt on native.
- Maricopa County Arterial Full Closure Requirements:**
- Letter from registered civil engineer for permitted work stating why road must be closed. (No other physical way to perform work)
 - Documentation of the names and numbers of the departments notified (Fire, Police, Transit Bus Routes, Trash, School District & any businesses in the area)
 - Hotline numbers on signs sending 24-hour complaints to the contractor (NOT to the County).
 - Variable Message Sign or Static board showing the duration of the closure. Ten (10) working days advance notice of a closure of the arterial road.
- ON SITE PRE-CONSTRUCTION MEETING REQUIRED:**
- Traffic control inspector must survey the location to determine if a full closure is necessary. (This must be done prior to placing signage to show closure)



Note: See Tables 8H-2 and 8H-3 for the meaning of the symbols and/or letter codes used in this figure.

Note: See TC-073 for Speed Reduction signage and locations.

	Left Lane Closure on Far Side of Intersection Typical Application		MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION TRAFFIC MANAGEMENT (TM&M)	
	DATE	PAGE	9/15	TC-206

2. Traffic Control Plan Requirements

2.1. Plan Requirements

A Traffic Control Plan shall be submitted by the Contractor/Developer and approved by MCDOT prior to the start of work. The Contractor/Developer is responsible for maintaining the site in a safe condition for workers and the public. Should it become necessary for Maricopa County to barricade or otherwise protect the site due to a hazardous condition, the Contractor/Developer shall be responsible for all incurred costs.

In addition to MCDOT Supplement to MAG Section 401.5, the following are the minimum requirements for all traffic control, unless otherwise provided for in the permit or as directed by the County Engineer or his/her representative.

Traffic Control Plans shall be required for all projects that;

1. Divert, detour, or interrupt the normal flow of traffic;
2. Maintain a work zone within 20 feet of the edge of pavement.

Traffic Control Plans may also be required for other projects. The purpose of a traffic control plan is to encourage forethought as to the time of day, sequence of construction, degree of restriction and traffic control needed. An approved Traffic Control Plan may be modified by MCDOT based on field conditions at the time of work.

Traffic Control Plans may range in complexity from use of typical illustrations in approved traffic control manuals to a detailed site plan showing signing, type of intersection, barricading, diversions, detours, and project phasing. In all cases, the required Traffic Control Plan shall satisfactorily address all construction restrictions, the requirements of the permit and these regulations. At a minimum, the following features, including dimensions, shall be incorporated in a Detailed Traffic Control Plan:

- project name
- project number
- north arrow
- existing signing
- existing striping
- posted speed limits
- road names
- required traffic control devices
- detours
- tapers
- pedestrian walkways
- bike lanes
- driveways/accesses

- parking
- construction fences
- roadway jurisdictions
- project phase of work
- the duration of the construction, work dates, and hours
- Contact person's name and telephone number of the barricade company that is installing the traffic control devices.

2.2. Temporary Traffic Control

Signs, barricades and channelizing devices shall be:

1. Installed prior to the start of any work;
2. Properly maintained and operated when restrictions exist;
3. Kept clean and fresh appearing at all times;
4. Kept in place only as long as needed;
5. Removed from travelled way during non-working hours when restriction no longer exists;
6. Removed from the right-of-way within two working days of completing work;
7. In accordance with MUTCD Standards.
8. Affixed with a 24-hour emergency telephone number on each device.

The "SPEED LIMIT 25" sign is used where the existing pavement has been removed, traffic is being maintained on temporary detour or diversion roads, unpaved shoulders, or on traffic lanes that are severely restricted.

It shall be the permittee's/contractor's responsibility to provide, erect, maintain and remove all necessary signs, barricades, barriers, sand berms, high level warning devices, off duty law enforcement personnel, lights, delineator, traffic plates, flagmen and other devices necessary to properly mark and control the construction areas for the safe and efficient movement of vehicular and pedestrian traffic. The permittee shall provide other traffic control devices or measures as deemed necessary by the County Engineer or his/her representative.

3. Plan Review/ Approval Process

The process for obtaining approval of a traffic control plan (TCP) varies by the type of construction or event proposed. In addition to the requirements set forth in Sections 3.1 through 3.4 that follow, any major traffic control plan shall also be submitted to the Transportation Systems Management (TSM) Division for review.

3.1. County Maintenance and Operations

Maintenance and operations activities performed by County employees (or MCDOT contractors) in or near the roadway shall require an approved traffic control plan. In accordance with the advance notice requirements outlined in Section 4.1.1, a proposed traffic control plan shall be submitted to the TSM Division for review and approval. The TSM Division will review and either approve or request changes to the plan.

3.2. Transportation Improvement Projects

In accordance with the advance notice requirements outlined in Section 4.1.1, the contractor shall submit a proposed traffic control plan to the Permitting, Construction and Inspections (PCI) Division. The PCI Division will review and either approve (with TSM's concurrence) or request changes to the plan.

3.3. Work under Permit in MCDOT Right-of-Way

Any permitted work that may impact roadway traffic shall require an approved traffic control plan. In accordance with the advance notice requirements outlined in Section 4.1.1, the utility or contractor shall submit a proposed plan to the Permitting Branch for review and approval. The Permitting Branch will either approve or request changes to the plan. When the traffic control plans contain street closures, detours, or multiple lane closures the TSM Division will also be notified prior to approval of the plans.

All persons, contractors, utilities and other agencies must notify the Inspections Branch for questions regarding traffic restrictions on County roads and streets. Request of proposed restrictions shall be e-mailed to the Traffic Control Coordinator and include appropriate traffic control plans for review at least two workdays (48 hours) prior to start of construction. All jurisdictional limits shall be shown on the Traffic Control Plan (TCP). Construction is not authorized to proceed without MCDOT approval of the TCP and concurrence that construction can precede with minimum public and traffic impact. Utility/water "bridges" shall not be allowed in the County Right-Of-Way.

3.4. Special Events

A special event applicant shall contact and meet with the Traffic Studies Branch Manager with the MCDOT TSM Division (602-506-4624) a minimum of 45 days in advance of the event. At this meeting the specific requirements of a Traffic Control Plan (TCP) for the event will be explained. The specific requirements for traffic control devices will depend on the size, type, and location of the event. The TSM Division will review, request changes and approve all plans for Special Events.

4.

General Traffic Control and Safety Guidelines



4. General Traffic Control and Safety Guidelines

4.1. General Traffic Regulations

4.1.1. Advance Notification to MCDOT

The amount of advance notice needed is contingent upon the functional classification of the roads and the positioning within the roads. All restrictions/closures require coordination with the controlling authority. The type of restriction and the amount of advance notice are shown below:

Table 1. Advance Notice Requirements

Type of Closure	Advance Notice Required
Full: Arterial/Collector	three (3) working days
Partial: Arterial/Collector	two (2) working days
Work near a traffic signal	three (3) working days

Work near a traffic signal must be coordinated with the Traffic Signal Branch Manager. The Contractor shall notify the **Traffic Signal Branch Manager (602-506-8660)** a minimum of three (3) working days prior to the start of any underground construction in the vicinity of signalized intersections.

In cases where a road closure(s) or a Special Event is proposed, an additional 10 working days advance notice shall be required for placement of variable message signs to alert drivers to the upcoming closure(s).

4.1.2. Traffic Restrictions

Except during emergencies or when pre-approved in the contract or by the TSM Division, the following apply during traffic restrictions:

- On all major streets, the Maricopa County Department of Transportation and Maricopa County Sheriff's Office local substation shall be provided with the name and phone number of the person responsible for 24-hour maintenance of traffic control devices.
- Traffic restrictions other than long-term restrictions, are not permitted on Arterial/Collector roads during peak traffic hours 6:00 a.m. to 8:30 a.m. and 4:00 p.m. to 7:00 p.m. weekdays unless authorized by the traffic or project engineer or their designated representatives.
- In order to keep nighttime noise to acceptable levels, Contractor/Developer shall not conduct any work during the hours of 7:00 p.m. to 6:00 a.m. without the written approval of the Traffic or Project Engineer.
- Special noise abatement conditions and procedures will be required if nighttime work is approved within the vicinity of residential properties in accordance with the MCDOT Noise Ordinance.
- Roads shall not be closed for construction activity unless prior approval is obtained from the Traffic or Project Engineer. Request for closure shall include an analysis of the impact of diverting traffic to alternate routes versus constructing a paved detour.
- For trenching diversions that move traffic from normal lanes, temporary bypasses shall be utilized during daylight hours only and traffic shall be restored to their normal lanes overnight if possible.

The use of traffic plates and temporary pavement shall be used. If conditions warrant, exceptions may be granted by the County Engineer or his/her representative. In addition to barricading and signing, portable barriers and/or sand berms shall be utilized for overnight diversions.

- Long-term closures for all Transportation Improvement Projects (TIP) must have the approval of the PCI Division and the TSM Division. All other long-term closures must have the approval of the TSM Division.

Lane restrictions shall adhere to the following:

Table 2. Lane Restrictions

Number of Lanes Under Normal Conditions	Minimum Number of Open Lanes Under Restricted Conditions
More than four (4) lanes	Two (2) lanes in each direction
Four (4) or less lanes	One (1) lane in each direction
One-way streets	One (1) lane

4.1.3. Special Requirements for Work near Traffic Signals

Special care is required when restricting traffic in the influence area of signals, because signals represent "pinch points" where road users only receive a portion of the "go" time. It is imperative that restrictions within 300 feet of traffic signals be minimized, and work planned to minimize the duration of such restrictions. If the work is within 300 feet of traffic signals then the presence of a uniformed police officer is required, as described by the work duration in the MUTCD. At multi-lane signals, restrictions may result in left-turn movement being removed and left-turn lanes being converted to a through-lane in the direction of the higher traffic volume.

4.1.4. Local Access Requirements

Local access shall be maintained to all properties on all streets (Arterial, Collector and Local) at all possible times. When local access cannot be maintained, it is the responsibility of the contractor and/or the appropriate MCDOT office to notify the affected property owners, residents, or tenants a minimum of one to two working days in advance. Alternative access accommodations shall also be explained. Full, unimpeded access needs to be restored as soon as possible.

4.1.5. Special Access Requirements to Protect Public Facilities

Access to fire stations, police stations, hospitals, transit facilities, bus stops, and schools shall be maintained at all times. When restrictions are necessary, the contractor and/or the appropriate MCDOT office shall coordinate such access restrictions with the responsible person in charge of the facility.

4.1.6. Special Pedestrian Accommodations

Access to sidewalks (paved or unpaved), marked and unmarked crosswalks (especially school crosswalks), and bus stops shall be maintained in a safe, usable condition. When their function cannot be retained, it is the responsibility of the applicant to first prove that closure is necessary, and secondly to locate and/or provide a safe and reasonable alternative walkway that meets all ADA pedestrian guidelines. This may require the contractor to repair, cleanup, and prepare a detour route before the day of the restriction to provide continuous, safe, and accessible conditions for the duration of the work.

4.1.7. Special Event Coordination Requirements

Extraordinary coordination efforts are required for major special events when they conflict with construction and maintenance. No construction and/or major maintenance activity will be allowed on roads used to accommodate event traffic ten (10) working days prior to the event and for the duration of the event. TSM Division will coordinate with other Agencies, County Departments, and Divisions, to determine the restriction area around the major event.

Additional information on special event traffic control is provided in Section 5 of this manual.

4.1.8. Holiday Season Requirements

Between November 15th and January 1st, holiday traffic creates congestion to the point that construction and maintenance activities must be minimized on Arterial/Collector Streets, which serve as the primary access to large retail shopping centers. Normally traffic restrictions near retail shopping areas and on busy Arterial/Collector streets are not allowed during the holiday season, TSM Division will only review the necessity of traffic restrictions in unusually critical situations on case-by-case basis during this time period.

4.1.9. Coordination between Projects

Coordination with other Contractors must occur between projects to ensure compatibility of temporary traffic control systems, and to ensure that duplicate signing is not being used. Overlapping traffic control plans shall not be allowed.

4.1.10. Emergency Contact Information

The Contractor shall provide MCDOT with a 24-hour emergency telephone number of the traffic control company. The responsible party's name and telephone number shall be placed on the backside of all temporary traffic control devices. The letters are to be clearly legible, and not less than one inch or more than two inches in height.

4.1.11. Field maintenance of Traffic Control Plan

Traffic lanes shall normally be 12 feet in width (minimum lane width of 11 feet) and have a minimum safe operating speed of 25 miles per hour. When the TCP calls for an asphalt or paved detour, the contractor shall provide and maintain it in a safe drivable condition and shall be constructed with a design life to complete the work/project.

Where traffic is diverted from the pavement, the contractor shall provide a suitable graded traveling surface with proper dust control. If the diversion will exceed five (5) working days, the diversion shall require paving. The minimum pavement structure shall be 3 inches of asphalt concrete on native material or greater, based on roadway usage.

When steel plates are used to cover open trenches, bump or steel plate ahead signs shall be installed to notify the motorist. Recessed steel plates shall have the immediate area milled very tight and the gaps filled with cold patch to minimize movement of the steel plates from their position and are required on all paved roadways to cover hazards and restore normal traffic flow during non-work times. Use of plates shall be for short time periods, not to exceed three working days. Extended use may be granted with the approval of the County Engineer or his/her representative. Cold patch may be used for up to seven working days and shall be maintained by the Contractor at no additional cost to the County.

The contractor shall maintain all traffic control devices 24 hours a day, 7 days a week (including weekend and holidays) for the entire construction or maintenance project. It shall be the permittee's, contractors, or traffic control company's (sub-contractor) responsibility to inspect all traffic control devices at least once during each workday, once per week during nighttime hours and immediately after a wind or rain storm. Any traffic control device not properly located shall be reinstalled immediately.

Traffic Control Technician: The Contractor shall appoint a Traffic Control Technician (other than the superintendent/foreman), who has been properly trained and certified in the application of work zone traffic control, to maintain all necessary traffic control devices. At the beginning and end of each workday and at a minimum of once during night time hours during the work week, and periodically throughout the day, the Traffic Control Technician shall inspect the construction work site. The Traffic Control Technician shall ensure that all construction signs and barricades are standing upright in accordance with the approved traffic control plan, free of dirt and debris and visible to intended traffic. At the end of the workday all non-essential traffic control devices will be removed. The Traffic Control Technician shall also inspect the construction work site at least once during weekends. The Contractor shall immediately correct deficiencies noted by the Engineer. The Contractor shall provide an after-hours pager and telephone number for the Traffic Control Technician at the pre-construction meeting.

4.2. General Safety Guidelines

4.2.1. Worker Safety

Everybody benefits when workers are able to complete their work in a safe environment. The unexpected nature of work zones and the constantly changing conditions that exist within work zones make workers particularly vulnerable to errant drivers. This section provides guidance as to the key components of promoting worker safety:

- **Training:** Workers should be trained by employers as to ways by which worker vulnerability is minimized and be certified traffic control personnel.
- **Safety Apparel:** Workers exposed to risks of moving roadway traffic or work equipment shall wear high-visibility safety apparel.
- **Work Areas:** Shall be planned so as to minimize worker exposure to risk from roadway traffic and work equipment.

The proper set up of temporary traffic control devices is a key procedure for promoting worker safety, but this chapter additionally addresses how service vehicles of workers can help promote worker safety. This section augments the national MUTCD with regard to surveyors, traffic signal, signing and striping technicians who have the difficult job of working within roadways, often for short enough periods of time where it is not practical to set up a full array of traffic control devices.

4.2.1.1. Night Operations for Pre-Planned Traffic Control

In order to provide enhanced warning and safety during dawn, dusk and night operations, the following steps should be followed:

- When work area is illuminated by use of flood lights, the light placement shall be such that the light beams are not hazardous to oncoming traffic.
- All warning signs and channelization devices shall use warning lights to mark all traffic control devices at night.
- Flaggers must be visible to approaching traffic and wear approved reflectorized garments.
- All workers must use the approved reflectorized garments as described in the MUTCD or in accordance with MCDOT standard procedures.
- When working at night, care must be exercised in not over-lighting the work area. An excess of rotating, flashing and different color lights may confuse the motorist. Refrain from using rotating or flashing lights in the vicinity of arrow boards. These lights take away from the message conveyed by the arrow board.
- Flares are strictly for emergency situations and must not be substitutes for standard work area devices. Flares shall not be used in combustible or high fire areas.

4.2.1.2. High Visibility Apparel Quality Requirements

All workers exposed to the risks of moving roadway traffic or construction equipment should wear high-visibility safety apparel meeting the requirements of International Safety Equipment Association (ISEA) "American National Standard for High-Visibility Safety Apparel" (see Section 1A.11), or equivalent revisions, and labeled as American National Standards Institute (ANSI) 107-2004 (or current edition) standard performance for Class 1, 2, or 3 risk exposure.

For daytime and nighttime activity, flaggers shall wear safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel" (see Section 1 A.11) and labeled as meeting the ANSI 107-2004 (or current edition) standard performance for Class 2 risk exposure. The apparel background (outer) material color shall be either fluorescent orange-red or fluorescent yellow-green as defined in the standard. The retroreflective material shall be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 ft. The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.

The standard specifies three conspicuity classes of garments based on wearer's activities:

- Class One (1) garments may be suitable for workers not directly in vehicle traffic paths and where vehicle speeds do not exceed 25 mph. Class 1 is suitable when workers' activities permit their full attention to approaching traffic. Parking service attendants, workers in warehouses with equipment traffic, shopping cart retrievers, sidewalk maintenance workers, and delivery vehicle drivers may wear this class of garment if above criteria are met.

- Class Two (2) garments are intended for users during activities that need greater visibility in inclement weather conditions or who perform tasks that divert their attention from approaching traffic; whose work environments have risks exceeding those for Class 1; and whose activities occur near roadways where traffic speeds exceed 25 mph but less than 50 mph. Workers who would typically wear this class of garment include railway workers, school crossing guards, high volume parking and toll gate personnel, delivery vehicle drivers, airport baggage handlers, ground crew, trash collection and recycling operations, ship cargo loading operations, forestry operations, roadway construction, utility, and emergency response and law enforcement personnel.
- Class Three (3) garments provide the highest level of conspicuity where traffic exceeds 50 mph and are intended for workers who face serious hazards where weather, work or other factors impair visibility or often have high task loads that require attention away from their work. The standard recommends these garments for all roadway construction personnel, flaggers, and vehicle operators, utility workers, survey crews, emergency responders, railway workers, and accident site investigators.

4.2.2. How Service Vehicles can best be used to Promote Safety

Worker safety can be enhanced with proper use of service vehicles. Service vehicles covered in this section are those required by the nature of their work to travel slowly, or stop for brief periods on MCDOT roads. Service vehicle operations are the backbone of the fleet, which allow effective maintenance of utilities, traffic control, pavement, and other roadway infrastructure.

When service vehicles must travel slowly or stop in the road lane or engage in slow moving work on the road shoulders for brief periods (one hour maximum), they will not have to set up advance warning but they shall display one of the following operating high level warning light systems.

- **Two Rotating Flashers or Strobe Light High Level Warning Devices** - These devices are designed to provide 360-degree visibility and may be used in combination with, or incorporated into a "light bar" for added visibility.
- **One Warning Arrow Boards** - Approved arrow boards shall be used in combination with rotating flashers, or strobe lights to highlight service vehicles, and warn motorists of lane merges or work activities.

Flashing lights on service vehicles need to be located so they remain in full view, front and rear, and are not obscured by dump beds, vehicle-mounted equipment, or work activities. The arrow board shall be mounted on a vehicle, a trailer, or other suitable support and should be provided with remote controls. Minimum mounting height should be 7 feet from the roadway to the bottom of the panel, except on vehicle-mounted panels, which should be as high as practicable.

When service vehicles stop for brief periods, standard operating procedure will be to display the special warning devices and the vehicle's four-way hazard warning flashers.

Arrow boards are powerful because they provide both warning and directional information ahead of time to motorists when the restriction causes traffic to change lanes. Because they are more effective than flashing lights, arrow boards are certainly preferable and in some cases, mandatory to support work zones.

5.

Special Events



5. Special Event

5.1. Special Events Definition

A special event is an activity conducted on, or adjacent to, County roads where:

- The participants intend to proceed or conduct themselves on the highway without complying with the direction of the permanent traffic control devices or the rules of the road; or
- Special traffic control may be required, such as flaggers, escort vehicles, special signing, or police officer supervision and control for the safe movement of highway traffic; or
- The closing of a portion of the roadway to the general public may be required; or
- The potential exists to interfere with the normal movement of traffic on the highway or create a hazard within the right-of-way to the participants, traveling public, or the public in general; or
- An activity occurs outside the roadway, but occurs within the highway right-of-way, and involves the use of highway facilities for non-transportation related purposes, and has the potential to slow, disrupt, or interfere with the normal flow of traffic on the highway.

5.2. Special Event Considerations

As part of the special event planning process, applicants should consider:

- What other events are scheduled throughout the County on the date or in the month you have planned your event?
- Where will people park?
- A traffic control plan is required. Remember that a street closure, even for two or three blocks, can affect traffic for miles around the venue due to event related traffic, and the rerouting of traffic around the closure.
- Does your street closure block or impede access to police stations, fire stations, hospital emergency access routes, churches, schools, businesses or residents?
- How does your event affect public transportation systems, such as the regional bus and light rail system, freeway and airport access? Are alternate routes available to accommodate daily use of these systems?
- Have you made plans to ensure that your event is accessible to the disabled?
- How will noise impact the surrounding neighborhood?
- Have you checked to see if construction/maintenance activities are planned?
- Is your Event going to be held during nighttime hours?

Addressing these issues early in the event planning process may reduce the traffic control requirements for a special event.

5.3. Requirements

5.3.1. Pre-Event Traffic Control Plan Meeting

A special event applicant shall contact and meet the Traffic Studies Branch Manager (602) 506-4624 with the MCDOT TSM Division a minimum of 45 days in advance of the event. At this meeting the specific requirements of a Traffic Control Plan (TCP) for the event will be explained. The specific requirements for traffic control devices will depend on the size, type, and location of the event.

5.3.2. Permitting Process Summary

The following permitting steps are required prior to the event:

- Applicant shall apply for permit to the MCDOT Permitting Branch. The application shall be accompanied by an event flyer, entry waiver, time/date/duration of event, liability insurance with MCDOT as an additionally insured and a professionally prepared TCP. A permit application fee of \$50 will be required.
- Permitting Branch will forward the TCP to the MCDOT TSM Division. The applicant shall request that the TCP be transmitted electronically to MCDOT by the barricade company that has prepared the TCP.
- The TSM Division will review, make changes and approve the TCP. A TCP review fee of \$100.00 per plan sheet shall be paid by the special event applicant.
- The applicant shall also post a refundable bond (amount proportional to the amount of traffic control required for the event, but in no case less than \$1,000.00).
- Upon approval of a TCP, the Permitting Branch will issue the permit, a copy of which will be sent to the TSM Division.
- A post Event meeting will be held with the TSM Division to discuss the pros and cons of the implemented TCP. Recommendations for changes/improvements to the TCP will be discussed for future planned Events.

5.3.3. Event Traffic Control

By signing the permit, the applicant/permittee shall be obligated to comply with the approved TCP as well as all terms and conditions of the permit.

The applicant shall be responsible for retaining a barricade company to implement and dismantle the approved TCP. All costs associated therewith shall be the responsibility of the applicant.

TSM Staff will be on-site during the Event to insure compliance to the approved TCP. If the traffic control company that is responsible for the implementation of the TCP doesn't comply with the approved TCP and a resolution of the discrepancies are not corrected in a timely manner MCDOT Staff will assume the responsibility of implementation of the TCP. Payment for MCDOT Staff time and equipment will be subtracted from the posted bond.

The applicant, through its selected barricade company, shall be responsible for the prompt removal (a maximum of three working days) of the temporary traffic control devices immediately following the

conclusion of the event. The Permitting Branch Inspector will verify removal of traffic control devices from the County right-of-way. If County forces are required to remove the traffic control devices, the costs of such removal shall be drawn against the posted bond.

Upon verification that all traffic control devices have been removed, the TSM Division will advise the Permitting Branch that the bond (less any draws as described above) may be refunded.

All traffic control associated with special events shall conform to the traffic control requirements and guidelines set forth elsewhere in this manual.

5.3.4. Special Requirements

For events with road or major lane closure, Changeable Message Signs and/or static signs shall be installed ten (10) working days in advance of the event to alert drivers of the upcoming closure(s). The number and location of these signs are dependent upon the size of the event and the number of roads impacted.

Furthermore, all lane or road closures or signalized intersection impacts will require the presence of one or more uniformed police officers to direct traffic. Volunteers or traffic control company flaggers are not permitted to direct traffic. The number and location of these officers are dependent upon the size of the event and the number of roads or intersections impacted.

6.

Temporary Traffic Control Devices and Applications



6. Temporary Traffic Control Devices and Applications

6.1. General Requirements

6.1.1. Why Use Temporary Traffic Control Devices

Temporary traffic control devices are used to alert and guide road users through locations where roadways have been temporarily reconfigured for maintenance, construction, special events, or due to incidents.

Temporary traffic control devices fall into four basic categories:

- Signage or Traffic Signals
- Barricades and Channelizing Devices
- Pavement Markings
- Portable Barriers

6.1.2. Removal of Temporary Traffic Control Devices When Not Applicable

This Traffic Control Manual requires that advance warning signs and barricade devices be immediately removed from drivers' sight lines when no longer applicable and moved off the roadway and onto the shoulder area and turned away from oncoming traffic. This has historically been a recurring problem, particularly with regard to advance warning signs, resulting in the subject being emphasized in this manual.

6.1.3. Channelization

Channelization devices work as a system. Periodic reminder signing (such as "KEEP RIGHT/LEFT" signs) shall be placed at each intersecting road and a maximum of seven hundred feet between intersecting streets within the work zone to convey the proper message to drivers. Channelization signs and devices must be provided whenever:

- Traffic is moved across the street center line;
- The existing center line is obliterated, or;
- Traffic is maintained in other than the normal traffic lanes.

6.1.4. Work Zone Speed Limits

Speed limit signs are regulatory signs, and conditions for establishing work zones speed reductions may be appropriate. Procedures to be used for determining if work zone speed reductions may be appropriate are outlined here. Speed reduction in work zones may be considered when the following conditions exist:

- Roadway grade differential (example: asphalt millings and reconstruction);
- Complex Driving Situations (example: traffic traveling on lanes normally not used or traffic moved to the shoulder area of the roadway);
- Insufficient lighting for driver visibility (example: night construction);
- Major/Abrupt traffic shift;
- Flagging operation.

Research has shown that achieving substantial speed reductions in work zones is difficult. Typically speed limits are not to be reduced by more than 10 miles per hour (MPH). At locations where the road user must use extra time to adjust speed and change lanes in heavy traffic a speed reduction appropriate to the roadway conditions is permitted.

6.1.5. Maintenance of Traffic Signs and Pavement Markings

Contractors are responsible for maintaining all traffic signs and pavement markings in their construction zones and for restoring the permanent traffic signs and pavement markings upon completion of their work.

During temporary traffic control operations, it is important to make sure that existing traffic control devices remain compatible with temporary traffic control being imposed. This includes, but is not limited to, signs, traffic signals, and pavement markings. The devices that remain applicable to the affected traffic must be maintained, while other devices must be relocated, completely removed, covered with approved sign slip covers or other approved methods.

If MCDOT needs to install/remove traffic control devices due to non-response by the contractor, the contractor shall be charged for all time, material and equipment used.

Maintenance requirements for each group of devices are detailed in the following subsections.

6.1.5.1. Traffic Signs

All post-mounted signs shall be maintained upright, clean, and in full view of the intended traffic by contractors at all times. If these signs interfere with construction, the contractor shall temporarily relocate the signs to permit construction. However, the devices must be kept in full effective view of intended traffic at all times. Portable signs may be helpful to augment other signs, which temporarily cannot be placed in their optimum position. Temporary Traffic Control signs shall be installed a minimum of 250 feet from existing permanent signs if possible. Existing signs that are no longer applicable shall be removed and salvaged as directed by MCDOT. When project is complete new signs shall be installed to MCDOT standards by the Contractor/Developer responsible for the project prior to release of the permit.

6.1.5.2. Procedures to be used near Traffic Signals

The Contractor/Manager shall keep existing signal equipment fully operational, and in full view of the intended traffic at all times. The only exception is when preapproved by the TSM Division. When necessary, vehicle detector sensing devices (typically inductive loops) and pedestrian push buttons may be deactivated with PRIOR approval. The request must be accompanied by a full explanation of why it is necessary to do so, what alternative procedures shall be used to accommodate traffic, and what efforts are being made to minimize the time the detectors will be out of service. Left-turn arrows shall be deactivated when left-turn prohibitions are in effect. Any deactivated devices shall be reactivated or replaced by the contractor expeditiously when work is completed. If traffic conditions are such that traffic signals cannot efficiently operate without sensor loops, the contractor may have to employ, at their cost, alternative detection devices. For this type of work, three working days advance notice to the Traffic Signal Branch Manager is required.

The exact location of underground equipment shall be determined by the Contractor/Manager prior to excavation. During all work, the Contractor/Manager shall exercise due care to prevent damage to existing traffic signal equipment. Should damage occur, the Traffic Signal Branch Manager must be notified immediately so that MCDOT can temporarily restore safe traffic signal operations.

See Chapter 7 for requirements for the use of uniformed officers when working near traffic signals.

6.1.5.3. Responsibility for Permanent Repair/Replacement of Damaged Equipment

Responsibility for permanent repair/replacement of damaged equipment shall be:

- At the contractor's expense IF the damage done was the result of failure to protect signal equipment properly blue staked in the intersection.
- At MCDOT's expense, IF the damage done was the result of improperly located or improperly verified markings.
- When existing signal equipment cannot be maintained, the County contractor shall, at their expense, have a qualified traffic signal contractor move the equipment to a temporary location. Another option is to provide temporary equipment capable of ensuring continuity of all signal functions (except vehicle detector sensing devices). The location and type of temporary signal equipment must be pre-approved by the TSM Division.

Signal equipment modifications shall be coordinated with the Traffic Signal Branch Manager by the Contractor/Manager a minimum of three working days in advance of work. When temporary or new equipment is installed to replace existing equipment, it shall be fully operational before the existing equipment is removed.

The Contractor/Manager shall restore signal equipment to its proper location, as soon as possible after all the work in the immediate area is completed. Traffic signal pedestrian push buttons must remain operational and accessible to pedestrians at all times unless provisions are made for manual control, or fixed time operation of the signal.

6.1.5.4. Traffic Signal Head Requirements

It is important that drivers be provided with at least two signal indications within the 40-degree cone of vision approaching the signal. If traffic is to be repositioned in such a manner that two signal heads will not be within the driver's 40-degree cone of vision, the Traffic Signal Branch Manager shall be contacted immediately at 602-506-8660.

6.1.5.5. School Zones

Work zone signing near school zones can dilute driver attention to the fact the school zone exists. Accordingly, depending on the situation, some school zones may benefit from strategic use of additional signs or flagging of signs to emphasize the school zone. This should be taken into consideration when laying out the temporary traffic control near school zones. Typically, the additional signs should be installed on the right side of the traffic lane. However, unusual detour arrangements might require them to be installed elsewhere for best target value.

Additional signing is intended to help compensate for the distraction caused by construction, and should not result in the use of too many signs. In some cases where the roadway is very wide and striped with a temporary centerline causing traffic to drive two vehicles side by side, it may be desirable to place the portable school signs close to the center of the approach pavement.

Temporary traffic control can be provided by using physical devices, or alternatively by employing manual control using police officers and, to a limited degree, flaggers. Physical devices will be discussed in this chapter, while manual control of traffic using police or flaggers is discussed in Section 7.

6.1.6. Temporary Traffic Signals

A temporary traffic signal system may be used to control vehicular traffic movements at construction or maintenance work areas, when a traffic engineering study indicates it is necessary. The TSM Division shall review and specifically approve each use. All traffic signal control equipment shall meet the applicable standards and specifications prescribed in Parts IV and VI of the MUTCD.

"TRAFFIC SIGNAL AHEAD" signs shall be placed in advance of all approaches to temporary traffic control signals. If it is desired to use temporary traffic signals, the contractor shall prepare a detailed TCP showing the location, use, timing, and hours of operation at each location for approval prior to implementation.

Signal controller phasing and timing must be pre-approved by TSM Division. Only police officers may manually control permanent or temporary traffic signals.

6.2. Sign Applications

Signs are a very important part of temporary traffic control. They are to be placed in advance, and at applicable points throughout traffic restrictions to provide navigational guidance to drivers. It is especially important to use initial warning signs in advance of traffic restrictions, to prepare drivers for conditions ahead.

Temporary Traffic Control signs on MCDOT roads follow the same, basic standards for signs specified in the MUTCD regarding size, color, and shape.

Warning and guide signs in temporary traffic control areas shall have a black legend on an orange background. Uniformity of signs used contributes to effectiveness so that similar conditions will be similarly marked with the same type of signs. This will help enable motorists to become conditioned to the required action indicated by signs. The less variation in signs, the fewer responses the motorist will have to learn.

6.2.1. Sign Sizes

Guidelines for sign sizes, colors, and shapes are shown in the MUTCD or the MCDOT Signing Manual. The size of sign needed is dependent on the size and speed of the road in question, and how much out of the direct line-of-sight of the driver the signs are placed. Signs placed within roadways offer optimum line-of-sight visibility to drivers, which mean they work well at a smaller size sign than would normally be used if mounted at the side of the road. Larger signs are important on higher speed, rural highways where signs are mounted well away from the edge of roadways. Accordingly, the sign sizes shown reflect the suggested sizes for signs installed within roadways (warning and regulatory signs). The size of sign used may need to be increased for emphasis and where unusual conditions exist, making larger signs desirable.

Warning sign shall be 48" X 48" on arterials/collectors and 36" X 36" on local roadways.

All Speed Limit Signs shall be a minimum of 36" x 48" on arterials/collectors and 30" X 36" on local roadways. All sign sizes shall be per the MUTCD or the MCDOT Traffic Signing Manual.

6.2.2. Sign Sheeting

All construction warning signs (black on orange) retroreflective sheeting shall be fluorescent orange Type VIII, IX or XI and all regulatory signs (black on white) retroreflective sheeting shall be a minimum of Type IV retroreflective sheeting.

6.2.3. Sign Mounting Heights

All advanced warning and regulatory portable signs are to be mounted on spring sign stands with minimum heights to the bottom of signs as follows:

- The minimum height, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement, of signs installed at the side of the road in rural areas shall be 5 feet (see Figure 6F-1 of the MUTCD).
- The minimum height, measured vertically from the bottom of the sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way, of signs installed at the side of the road in business, commercial, or residential areas where parking or pedestrian movements are likely to occur, or where the view of the sign might be obstructed, shall be 7 feet (see Figure 6F-1 of the MUTCD).
- The minimum height, measured vertically from the bottom of the sign to the sidewalk, of signs installed above sidewalks shall be 7 feet.
- The height to the bottom of a secondary sign mounted below another sign may be 1 foot less than the height provided above.
- Neither portable nor permanent sign supports should be located on sidewalks, bicycle facilities, or areas designated for pedestrian or bicycle traffic. If the bottom of a secondary sign that is mounted below another sign is mounted lower than 7 feet above a pedestrian sidewalk or pathway (see Section 6D.02), the secondary sign should not project more than 4 inches into the pedestrian facility
- All ground mounted signs are to be mounted on standard sign supports and shall meet the requirements in the MUTCD.
- Channelization devices consist of vertical panels or other portable supports and reminder signing (such as "KEEP RIGHT/LEFT" signs) for clarification of temporary centerline and for drivers entering the work zone at intersections. The bottom of the "KEEP RIGHT/LEFT" signs shall be a minimum of 1 foot above the traveled way. The "KEEP RIGHT/LEFT" signs shall be installed on tangent sections of a roadway at a minimum of 700 feet apart and at all intersections.

6.2.4. Sign Mounting Procedures and Placement

Portable supports should be used for short-term and moving operations. Street side supports may be used when authorized for construction speed limit and advance warning signs on long-term, fixed construction operations, such as major street reconstruction.

For maximum mobility on certain types of construction and maintenance operations, signs may be mounted on a vehicle stationed in advance of the work, or moving along with it. This may be the working vehicle, pavement marking equipment, crack-sealing equipment, or a vehicle provided expressly for this purpose.

All temporary traffic control devices shall be stabilized with sandbags or other approved material (ballast) when necessary. Ballasts shall be placed on the lower part of the frame or on the base and not be placed on top of any traffic control device. The use of rocks, concrete, asphalt chunks, concrete blocks or similar materials as ballast is prohibited. Ballast should be placed on the base of all portable signs that are unattended.

Flagging, orange fencing, and/or woven plastic tape may be required at open trenches/excavations and/or used between lighted barricades and channelizing devices in construction areas to provide additional guidance and security. Open trench signs shall be installed on all open trenches.

Channelizing devices are not intended to be physical barriers.

Metal signposts, such as those commonly used to mount permanent traffic signs and steel streetlight poles, are acceptable sign supports. However, signs shall not be mounted on wood utility poles or placed in areas intended for pedestrians. Where necessary to do so, care shall be taken to minimize interference with pedestrians and wheelchair accessibility.

As a general rule, portable signs are to be located on the right side of the street when right-lane traffic is restricted, and additionally on the centerline or median, when left-lane traffic is restricted. Post-mounted signs shall be located on the right side of the street and in protected medians. Where special emphasis is required and more than one lane of traffic exists, dual signs shall be provided approximately opposite each other.

Care shall be taken when signs are placed in the two-way left-turn lane, to not obstruct access to or from driveways or intersecting streets.

6.3. Barricade and Channelization Applications

Barricades and channelizing devices are the most important part of temporary traffic control in temporary traffic control areas. They are used to warn and alert motorists of upcoming temporary restrictions, and to guide motorists and pedestrians through restricted areas. They are also used to separate vehicular traffic from the workspace, pavement drop-offs, pedestrians, and opposing traffic.

They are not intended to be physical barriers. Barricades and channelizing devices should always be used in groups to warn and guide traffic.

6.3.1. Taper Lengths

Barricades and channelizing devices used to guide motorists must provide a smooth, gradual transition, when moving traffic from one lane to another, onto a bypass detour, or when reducing the width of the street. This smooth, gradual transition is referred to as the "taper length." The minimum desirable merging taper length formulas are shown in Table 3.

Table 3. **Merging Taper Length Calculations**

Speed Limit	Formula
40 mph and less	$L = WS^2/60$
45 mph and greater	$L = WS$
<i>L = Taper Length (ft) W = Width of Lane (ft) S = Posted Speed Limit (mph)</i>	

Table 4 shows the typical merging taper length and spacing of devices for tapers calculated from the formulas in Table 3.

Table 4. **Typical Merging Taper Lengths and Spacing Between Devices**

Speed Limit (mph)	Taper Length = L (ft)					Spacing between Devices (ft)
	Lane Width = W (ft)					
	10	11	12	13	14	
25	104	115	125	135	145	25
30	150	165	180	195	210	30
35	205	225	245	265	285	35
40	270	295	320	345	375	40
45	450	495	540	585	625	45
50	500	550	600	650	700	50
55	550	605	660	705	770	55

Minimum desirable taper lengths apply to streets of relatively flat grade and straight alignment. Adjustments may be desirable to provide adequate sight distance on the approach to channelization, and to accommodate cross streets and adjacent driveways. In urban areas characterized by short block lengths and driveways, longer tapers have not proven to be better than shorter ones. The reason for that is that extended tapers tend to encourage sluggish operation and encourage drivers to delay lane changes unnecessarily to the last moment, which creates friction.

When lanes are not merged together, but rather simply re-directed, a more moderate shifting taper equal to half of the taper lengths (1/2 L) shown in Table 4 is used. A shoulder taper length of 1/3 L is appropriate. When more than one lane is to be closed in the same direction, a tangent should be provided between lane drops. The tangent length between two lane drops should be 2L.

6.3.2. Barricades

Barricades and channelizing devices are also used to protect workers in the street and to guide and protect pedestrians. Consequently, it is important that the design of barricades and channelizing devices be substantial enough to provide protection, yet not pose a threat to road users should a collision occur.

Typical uniform applications of barricades and channelizing devices are shown in the barricade illustrations included in the MUTCD. Situations not illustrated, shall be handled in conformance with the general methods set forth herein.

Barricades used in MCDOT jurisdiction are: Type I, II and III barricades and vertical panels. Markings for all barricade panels shall be alternate orange and white stripes sloping down at a 45-degree angle to the side on which traffic is to pass. Both stripes (orange and white) shall be Type IV retroreflective sheeting.

All barricades shall be constructed of suitable materials. Type I and II barricades and vertical panels are intended for use to channelize traffic through temporary traffic control areas. Type I and II barricades and vertical panels are also used to delineate hazards in or near the street or sidewalk, or to close Collector/Local streets or sidewalks and alleys. When used to delineate hazards parallel to traffic, spacing should not exceed a distance in feet equal to 2.0 times the posted speed limit in mph. Vertical panels are used to channelize traffic, but Type I and II barricades provide more target value and are more effective when roadside hazards exist. When used to close streets, sidewalks, and alleys, spacing should not exceed 5 feet (see Table 4 for spacing and taper lengths).

6.3.3. Barricade Warning Lights

Barricades used during hours of darkness are to have an approved barricade warning light attached, and operational. The warning light is to be mounted above the top panel and on the end of the barricade closest to traffic.

- Type A, flashing warning lights are used to delineate hazards and close streets, sidewalks, and alleys.
- Type C, steady-burn warning lights are used in a series to channelize traffic and to guide traffic through construction areas.

Barricade warning lights are amber, mounted atop appropriate traffic control devices to call attention to the device, and to provide alignment information to motorists. They shall be mounted on all signs, barricades, and channelizing devices, as specified in the TCP. Barricade warning lights shall be in operation during hours of darkness. Warning lights are portable, battery, or solar powered, lens directed enclosed light, which must be maintained so that the light provides proper illumination during hours of darkness.

Warning lights are to have a minimum seven-inch diameter lenses that emit amber light and comply with the current Institute of Transportation Engineers (ITE) Purchase Specifications for Flashing and Steady-Burn Warning Lights.

There are three types of warning lights:

- Type A, Low Intensity Flashing Warning Lights are used to help warn drivers during nighttime hours, They shall be used on all signs mounted on portable supports, and on all channelizing devices (except cones and tubular markers) used to mark hazards and close streets. Type A warning lights are not intended to guide traffic.
- Type B, High-Intensity Flashing Warning Lights are used to help warn drivers both daytime and nighttime, and shall be used on advance warning signs that are street mounted for major street construction and on "Flag Type" High Level warning devices when used at night.

- Type C, Steady-Burn Warning Lights are to be used on barricades and vertical panel channelizing devices when used to guide traffic, form tapers, and delineate centerlines, lane lines, and the edge of the traveled way. Type C warning lights may be used on devices to mark hazards, but they are generally less effective than flashing lights for this purpose.
- 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 D 360-degree warning lights should be only used on devices on the outside of the curve, and not on the inside of the curve.

6.3.4. Channelizing Devices

Channelizing devices used in Maricopa County include the following two types:

Traffic Cones: Are effective for daytime channelization of traffic and to delineate minor maintenance areas. Traffic cones are versatile because they are portable and if struck, they will minimize damage to vehicles. They can be set up and removed quickly. When traffic cones are approved on the Traffic Control Plan for use, it is necessary to check them often because vehicles frequently move them. The minimum height for cones is 28 inches and minimum weight is 10 pounds on roadways posted 45 mph or greater and 7 pounds on roadways posted 40 mph or less. All traffic cones SHALL have retroreflective bands as required by the MUTCD. Traffic cones used for pavement surface treatments are not required to have retroreflective bands

Under the following conditions, the use of traffic cones is permitted on County maintained roadways:

- Day light hours only
- Shoulder closures
- Pavement surface treatments (chip seal, preservative, etc.)
- Pilot car/Flagger Operation
- Special Events
- Emergency Situations (until permanent devices can be installed)

Under the following conditions, the use of traffic cones is NOT permitted on County maintained roadways:

- Nighttime (1/2 hour prior to sunset until 1/2 hour after sunrise)
- Lane merges/diversions
- Paved shoulder diversions
- Multilane diversions
- Traffic on the wrong side of the centerline
- Utility adjustments
- Installing survey monuments
- When work activity is not in progress

Vertical Panel Channelizing Devices: Vertical panels are devices to enable 24-hour channelization. They are used in place of traffic cones when channelization is needed, during hours of darkness. They are versatile because their height and amount of retroreflective sheeting makes them substantially more visible than normal pavement markings. They are portable, lightweight, and use less street width than standard barricades. Markings on vertical panel channelizing devices shall be alternate orange and white stripes,

sloping down at a 45-degree angle to the side on which traffic must pass. When used to divide two traffic lanes in the same direction, the stripes shall slope down to the side on which traffic is being diverted. Both stripes (orange and white) shall be reflectorized with Type IV retroreflective sheeting. The base and panel support should be substantial, designed to prevent overturning, and yet sturdy enough to ensure they do not become a projectile. Because the base can be an obstacle to traffic when overturned, the base and support should be designed to minimize damage to a vehicle if struck. The base and panel support shall be galvanized, aluminum, or white in color, except rubber bases, which may be black. Vertical panels are used to channelize traffic, divide opposing lanes of traffic, divide traffic lanes when two or more lanes are maintained open in the same direction, and in place of standard barricades where space is limited. When vertical panels are used to channelize traffic, they shall be placed on a taper to guide motorists past hazards. Vertical panels used during hours of darkness, shall have an approved and operating barricade warning light mounted on top.

6.3.5. Arrow Boards

Arrow boards should be positioned on the shoulder, or in the parking lane, and at the beginning of the taper, where possible. When width is restricted, the arrow panel should be positioned behind the required channelization near the start of the merging taper. When arrow boards are used to close multiple lanes, a separate arrow board shall be used for each closed lane.

Since use of arrow boards can cause unnecessary lane changing, their best use is for closed lanes and they shall not be used for shoulder or roadside work activities in the arrow mode.

Minimum mounting height should be 7 feet from the roadway surface to the bottom of the panel, except on vehicle-mounted panels which should be as high as practicable. Arrow boards are to be in compliance with the specifications provided in the latest MUTCD.

6.3.6. Changeable Message Signs (CMS)

Mobile, electronic sign displays, such as changeable message signs may be mounted on a trailer. Experience has proven the effectiveness of providing advance notice of projects through the use of Changeable Message Signs. This notice requires ten working days in advance of the work. Careful attention needs to be given in the placement of these signs so they do not impede pedestrians, block driveways, or create visibility obstructions. A Changeable Message Sign may be used to simulate an arrow board display.

All provisions of Chapter 2L of the 2009 MUTCD are applicable to temporary CMS installation as part of traffic control plans.

6.3.6.1. CMS Message Requirements

Each message shall consist of no more than two phases. A phase shall consist of no more than three lines of text with 8 characters per line. Each phase shall be understood by itself regardless of the sequence in which it is read.

Messages shall be centered within each line of legend. If more than one CMS is visible to road users, then only one sign shall display a sequential message at any given time.

Techniques of message display such as fading, rapid flashing, exploding, dissolving, or moving messages shall not be used. The text of the message shall not scroll or travel horizontally or vertically across the face of the sign.

The maximum length of a message should be dictated by the number of units of information contained in the message, in addition to the size of the CMS. A unit of information, which is a single answer to a single question that a driver can use to make a decision, should not be more than four words.

When designing and displaying messages on changeable message signs, the following principles relative to message design should be used:

- The minimum time that an individual phase is displayed should be based on 1 second per word or 2 seconds per unit of information, whichever produces a lesser value. The display time for a phase should never be less than 2 seconds.
- The maximum cycle time of a two-phase message should be 8 seconds.
- The duration between the display of two phases should not exceed 0.3 seconds.
- No more than three units of information should be displayed on a phase of a message.
- No more than four units of information should be in a message when the traffic operating speeds are 35 mph or more.
- No more than five units of information should be in a message when the traffic operating speeds are less than 35 mph.
- Only one unit of information should appear on each line of the CMS.
- Compatible units of information should be displayed on the same message phase.

6.3.6.2. CMS Character Requirements

CMS should be limited to no more than three lines, with no more than 8 characters per line.

The spacing between characters in a word should be between 25 to 40 percent of the letter height. The spacing between words in a message should be between 75 and 100 percent of the letter height. Spacing between the message lines should be between 50 and 75 percent of the letter height.

Word messages on changeable message signs should be composed of all upper-case letters. The minimum letter height should be 18 inches for changeable message signs on roadways with speed limits of 45 mph or higher. The minimum letter height should be 12 inches for changeable message signs on roadways with speed limits of less than 45 mph.

The width-to-height ratio of the sign characters should be between 0.7 and 1.0. The stroke width-to-height ratio should be 0.2. The width-to-height ratio is commonly accomplished using a minimum font matrix density of five pixels wide by seven pixels high.

6.4. Pavement Marking Applications

Temporary Pavement Markings shall be per the MUTCD and the MCDOT Striping Manual.

Temporary pavement markings may be used to guide traffic in temporary traffic control areas when clean, hard surfaced street or detour roadway surfaces exist. Temporary pavement markings must be kept clean at all times. Normally, they should be used in combination with signs, barricades, and channelizing devices.

Existing pavement markings that cause driver confusion by seriously conflicting with the intended vehicle path (indicated by barricades and channelization devices) shall be removed or obliterated by the Contractor/Developer, as directed by the TSM Division. The County purposefully requires use of portable traffic control devices to substitute for pavement markings within work zones because these large, three-dimensional devices dominate surface pavement markings to the point that they typically eliminate confusion. This usually means that substantial pavement marking obliteration is only required on long-term or high-speed projects such as detours, special channelization for bridge construction, and similar fixed location projects. However, using engineering judgment, the County reserves the right to require the removal or obliteration of existing pavement markings anywhere that driver confusion exists due to pavement markings. If pavement marking obliteration is needed, high pressure water or other approved method shall be used. Any scarring or damage to the roadway shall be repaired by the approved method (typically a microseal or slurry seal). Painting over existing markings with black paint or asphalt material is not acceptable.

Reflective paint lines, pavement marking tape, or temporary reflective tabs may be used for temporary traffic control when approved in the TCP or by the TSM Division.

Upon project completion, temporary markings shall be removed and permanent markings replaced.

6.5. Portable Barrier Applications

Temporary concrete barriers are usually pre-cast, reinforced concrete, commonly referred to as Jersey Barriers. These devices are approximately 32 inches high, vary in length, and taper from a wide base to a narrow top. They are designed to be physical barriers placed parallel to traffic lanes to help prevent penetration by vehicles leaving the traveled way, thereby minimizing injuries to vehicle occupants, and to protect workers, bicyclists, and pedestrians.

The four primary functions of temporary concrete barriers are:

- To keep vehicular traffic from entering work areas, such as excavations or material storage sites;
- To separate workers, bicyclists, and pedestrians from motor vehicle traffic;
- To separate opposing directions of vehicular traffic; and
- To separate vehicular traffic, bicyclists, and pedestrians from the work area as false work for bridges and other exposed objects.

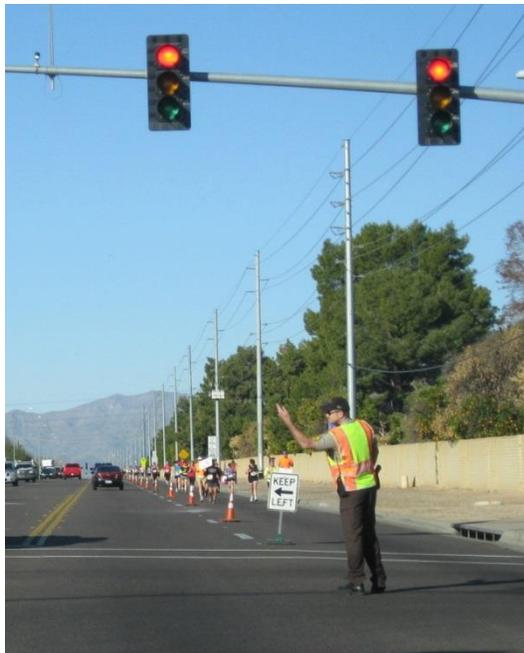
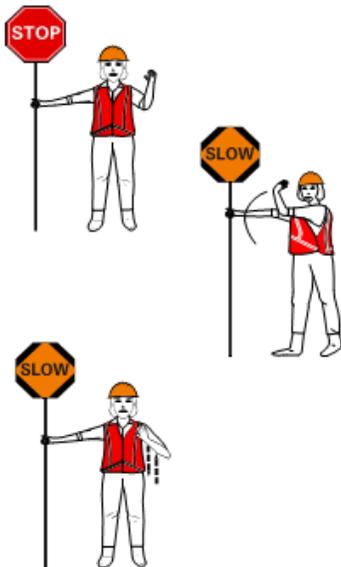
Portable barriers shall only be used in combination with the required signs, and supplemented with standard barricades, and channelizing devices for improved daytime and nighttime visibility. Spacing for barricade warning lights and vertical panel markings shall be as required for vertical panel channelizing devices.

Portable Jersey Barriers shall be required when construction hazards warrant or when directed by the County Engineer or his/her representative. The traffic approach ends of all portable barriers shall be protected from vehicle impact by the use of impact attenuators or flaring the ends away from the traveled way. When space permits, approach ends shall meet or exceed the requirements for the flaring of the temporary concrete barrier in the "Arizona Department of Transportation Traffic Control Design Guidelines" current edition. When space does not permit, barrier ends shall be protected with impact attenuators, as required in the MUTCD.

Temporary concrete barriers shall be shown in the TCP and approved by the TSM Division.

7.

Uniformed Officers/ Flagger



7. Uniformed Officers/ Flaggers

7.1. General

Use of police officers for manual control of traffic is important during some forms of temporary traffic control work. The primary time when police control is required is at traffic signals, when less than the usual numbers of lanes exist due to construction/maintenance work. The reason signals are installed in the first place is because of high traffic on both streets. When those lanes are removed, it is important that manual control replace electrical control to allocate green time equitably and to best move traffic.

Manual control of traffic is essential at times. Using police officers and flaggers can accomplish things that no physical traffic control device can do. Police officers and flaggers can visually assess traffic conditions and respond accordingly.

Only uniformed law enforcement officers are allowed to direct traffic in Maricopa County in order to expedite enforcement (citation writing), empower ready communication, enable performance feedback, and ensure reliability.

7.2. Police Control

On-duty Police Officers are only available for use during emergency conditions and for traffic control during restrictions by MCDOT when traffic conditions warrant.

Off-duty Police Officers, when needed, are to be hired by the contractor. Police officers that are alert, visible, and accommodating can be valuable public relations asset for both the County and contractor. Conversely, they can create a poor image for the County if they are not contributing to the efficient and safe movement of traffic. Since officers wear an official uniform, their performance reflects powerfully upon Maricopa County. Expectations of Maricopa County and employers of police officers hired to provide manual traffic control are set high. When police officers are hired to support construction/maintenance/special event efforts, officers shall:

- Perform in a manner that favorably reflects on Maricopa County,
- Manually operate signals in such a manner so as to benefit pedestrians, public vehicular traffic, as well as the contractor,
- Position themselves in such a manner as to have access to the traffic signal cabinet, yet maintain a full view (360-degree vision) of ALL traffic movements,
- Directs traffic control in intersection as needed or required,
- Station their vehicle in a manner that does not block sidewalks, or block traffic.

Upon arrival at the job site, the off-duty police officer shall:

- Contact the contractor and/or assigned County inspector to receive detailed instructions on how the movement of the displaced traffic is to be sequenced through the signalized intersection,

- Be equipped with the proper equipment (i.e., highly visible safety vest, signal cabinet access key, two-way radio, etc.) as required to perform this vital temporary traffic function,
- Assure that physical obstructions (i.e., no vehicles parked on sidewalks and/or near the signal controller cabinet) are not preventing access for pedestrians with disabilities,
- "Stand-their-post" at all times except for during planned breaks (i.e., not simply watching work being performed, etc.). As with any employer, breaks need to be coordinated with the contractor. This includes work shift changes for continuous operation.

Off-duty police officers duties include, but are not limited to the following:

- Assisting pedestrians as well as vehicles when needed or when requested.
- Keeping traffic lanes functional, and free of illegally parked or workers' vehicles by arranging for their removal.
- Confirming contractor set-up has proper advance warning signs posted.
- Doing what is necessary to facilitate manual traffic control when needed to cope with unforeseen traffic pattern changes, such as during blasting operations.
- Observing, and immediately reporting traffic problems to the appropriate contractor and assigned inspection staff.
- Enforcing speed limits/other restrictions in or near the work zone.
- Assisting as needed with temporary traffic control setup and takedown activities.
- Assist troubled flagging operations by providing a more authoritative presence to motorists.

Police officers or flaggers, depending on the situation, are required at locations where equipment is intermittently blocking or crossing a traffic lane, or where only one traffic lane is available for two directions of travel.

Police have the authority under State Law to control traffic and also possess special training. These characteristics make police officers important to use at multiple lane, signalized intersections, when traffic is restricted to one through traffic lane in any one direction. Additionally, police officers may be required at signalized intersections when restricted to less than the normal number of lanes. Police officers or flaggers, depending on the situation, are required at times when a large number of trucks enter and leave construction sites. Use of police officers is mandatory whenever manual control of more than one lane of traffic is necessary, as such control cannot be done by flaggers from the edge of the roadway. Police officers are to be provided in other situations when required by County Inspector.

7.3. Flagger Control

Flaggers are limited by the MUTCD to flagging operations that can be accomplished from the edge of the traveled way. Flaggers cannot operate traffic signals.

All flaggers shall be properly trained and certified by a recognized source and shall carry with them at all times proof that training and certification have been completed within the last four years.

Flaggers should be alert, courteous, neat, and possess a sense of responsibility for the safety of the public and work crews. For daytime and nighttime activity, flaggers shall wear safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel" (see Section 1 A.11) and labeled as meeting the ANSI 107-2004 (or current edition) standard performance for Class 2 or 3 risk exposure, highly visible safety apparel meeting the standards provided in the latest edition of the MUTCD. Flaggers shall also wear an approved hard hat and incorporate the use of an authorized STOP/SLOW paddle to manually control traffic. When used at night, the STOP/SLOW paddle shall be retroreflectorized.

The STOP/SLOW paddle shall be 18 inches wide and octagonal shape with 6 inch Series C letters. The STOP face shall have a red background with white letters and border. The SLOW face shall have an orange background with black letters and border. The sign shall be mounted on a suitable staff to support the sign a minimum of 5 feet from the ground when in use.

The use of flags for controlling traffic is limited to emergency use only.

7.3.1. Flagging Procedures:

Flaggers shall be stationed at a readily visible location on the shoulder, or behind channelization, in advance of the restriction. "FLAGGER AHEAD", "ONE-LANE ROAD AHEAD" and "BE PREPARED TO STOP" signs shall be used in advance of each station. At no time should a flagger be allowed to stand in the traveled portion of the roadway, or cross a traffic lane to stop more than one lane of traffic. Each flagger station shall be adequately illuminated during the hours of darkness and comply with Section 4.2.1.1 herein. All traffic control devices, including the STOP/SLOW sign and the flagger's vest, shall be reflectorized. Signs, barricades and channelization in advance of each of the Flagger station shall have barricade warning lights attached and in operation.

7.3.2. Pilot Cars

Use of pilot cars shall conform to the approved Traffic Control Plan and Section 6C.13 of the MUTCD.

7.4. Intersection Restrictions

Off-duty uniformed police officers are required at all major intersections when restrictions are present, and may be required at other locations as requested by the Traffic Engineer. Any work performed in the right of way within 300 feet of an intersection shall be considered as restricting the intersections. Refer to Section 4.1.3 for additional requirements when working near intersections.

8.

Pedestrian Safety and Accommodation



8. Pedestrian Safety and Accommodations

Proper advanced planning for pedestrians near temporary work zones is as important as planning for vehicular traffic. It is particularly important that anytime pedestrian service will be affected (transit stops, access, or sidewalks) by a project; the TCP will give full consideration to the adverse impacts their work may cause. A goal is to minimize adverse impacts anytime normal pedestrian service is threatened. This requires proper forethought to preserving as much service as possible. When service needs disrupting, alternative but practical service needs to be provided. Cognitive or visually impaired pedestrians should not have to face unnecessary inconvenience or be subjected to consequences, simply because those working in the street failed to consider them.

8.1. Special Pedestrian Considerations

Except during emergencies, pedestrian service/safety needs to be fully preserved at crosswalks (marked/unmarked) and other facilities used by pedestrians. Facilities must be kept safe and usable at all times. If temporary disruptions of pedestrians are required, the TCP needs to accommodate pedestrians to the satisfaction of the TSM Division.

The provisions for protection of pedestrian service outlined in the MUTCD are applicable to all persons doing work that influences pedestrian facilities (sidewalks or marked/unmarked crosswalks). The five fundamental principles for successfully accommodating pedestrians through work zones are:

- Traffic and pedestrian safety must be an integral and high-priority element in every project, from planning through design and construction.
- Pedestrian and traffic movements should be inhibited as little as practical, and planned to reduce exposure to potential hazards.
- Pedestrians and motorists should be separately guided in a clear and positive manner while approaching, traversing, and leaving work sites.
- Personnel must be adequately trained in the proper management of pedestrian and traffic control, so they are qualified to make work zone safety decisions in the selection, placement, and maintenance of traffic control devices.
- Pedestrian paths through the work zones should replicate as nearly as possible the elements of the existing path and be accessible to people in wheelchairs.

8.2. Closure of Pedestrian Facilities

Full utility of a pedestrian facility is achieved by keeping it entirely clear. Where the full facility cannot be kept functional, it is essential that a clear path be provided that is a minimum of 36-inches in width to conform to the Americans with Disabilities Act (ADA). Accordingly, special care is important in placing traffic control devices and other equipment and material.

If a 36-inch wide walking surface cannot be kept clear, it is not considered functional. On the rare occasion when it is required to take sidewalks out of service, alternative and accessible provisions must be made that meet ADA requirements. The only exception to this is on the very rare occasion when a

walkway has to be totally/or completely closed for safety reasons (this can only be done if no businesses or bus stops require access beyond the closure).

When a temporary work zone requires the closing of pedestrian facilities such as marked or unmarked crosswalks, or walkways, provisions shall be made in advance by the contractor to provide fully accessible, alternate temporary walkways that direct pedestrians through a reasonably safe, usable, and convenient route. Contractors/Managers requesting a complete or partial walkway closure on one side of the road must first diligently accommodate pedestrians on accessible alternative paths on the same side of the road to prevent:

- Pedestrians from having to cross streets twice
- Disruption of transit services
- Interference with business accesses

Temporary walkways can be designated using portions of the existing sidewalk, or on rare occasions, in the adjacent parking lane if conditions and capacity permit. If a moving traffic lane is authorized, extraordinary care must be taken to properly shield and protect the walkway from errant vehicles.

If after due deliberation, walkway closures are necessary, the alternative provisions must make sure that pedestrians are provided with a suitable path consistent with ADA regulations and the facilities should only be taken out of service for the minimum time necessary.

Additionally, the following actions need to be taken:

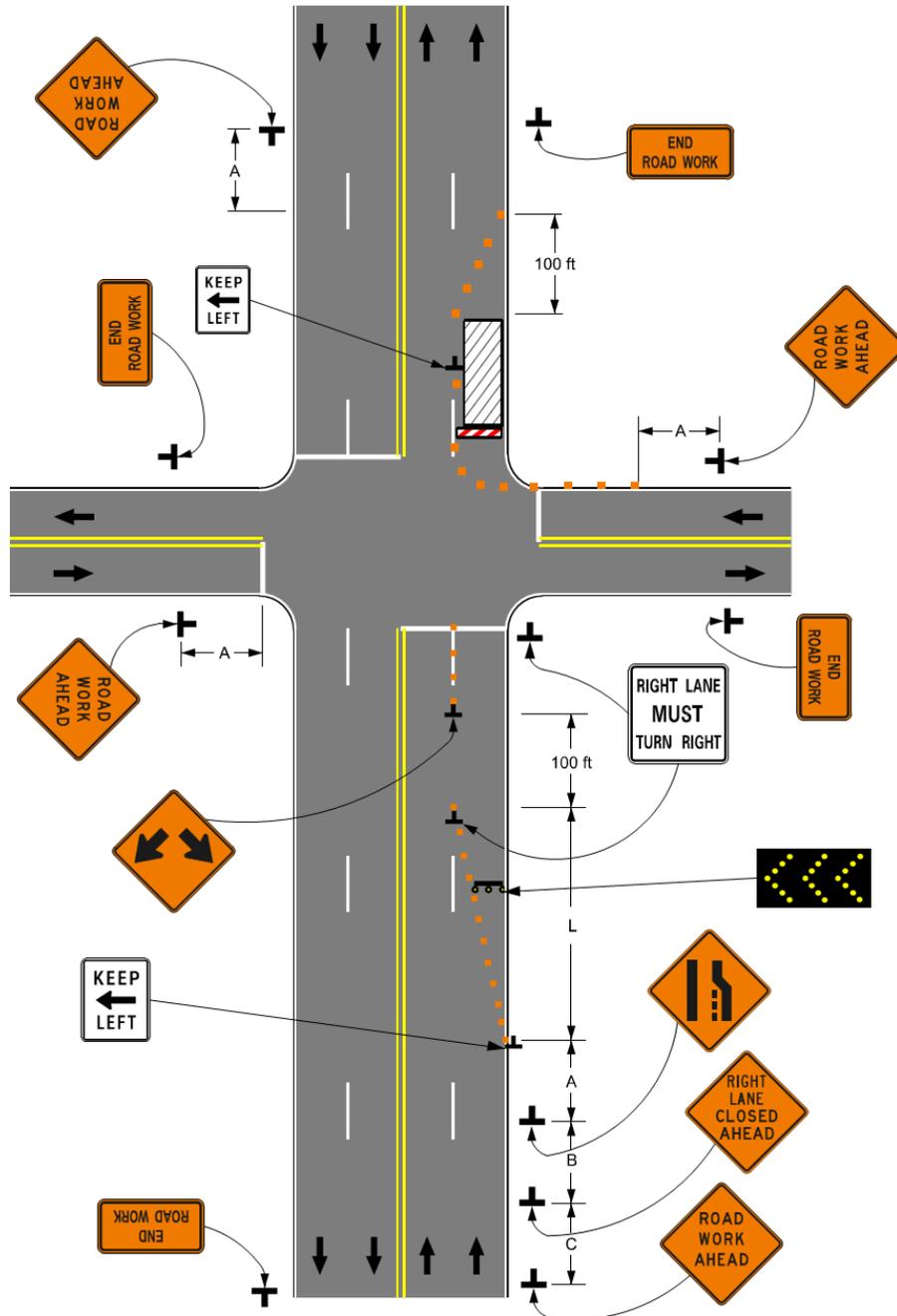
- Walkways shall always be clearly identified, wheelchair usable, shielded from motor vehicle traffic, and free of pedestrian hazards such as holes, debris, gravel, mud, etc.
- When pedestrian paths are redirected on the same side of the street, the "PEDESTRIAN" sign, with an appropriate direction arrow, shall be used to direct pedestrians to the alternate walkway.

When pedestrian paths are being maintained in advance of a full closure, the "SIDEWALK CLOSED AHEAD" sign should be placed at the appropriate end(s) of the block where pedestrians have the last opportunity to use a crosswalk to cross the street. Special care needs to be taken to place the sign so it is prominently visible, yet taken to assure that sign placement leaves adequate maneuvering room for disabled users to be able to cross to the other side of the street, or continue on the accessible path to their regular destination.

For complete sidewalk closures, "SIDEWALK CLOSED CROSS HERE" signs shall be provided at the crosswalk nearest each end of the closure. Where there is no pedestrian landing area on the far side of an intersection, "near-side" signs with the same message supplemented with additional standard barricades, should be placed to clarify the sidewalk on the far side is inaccessible. "SIDEWALK CLOSED" signs shall also be placed adjacent to the actual sidewalk closure.

9.

Typical Applications & Forms



9. Typical Applications and Forms

9.1. Typical Applications

MCDOT has developed sample traffic control plans for the most commonly encountered situations. As all field locations are different, good judgment must be used in adapting the sample plans to actual field conditions. The following samples are provided in Appendix A:

Type	Title	Detail #
Traffic Control Basics	Component Parts of a Temporary Traffic Control Zone	TC-001
	Types of Tapers and Buffer Spaces	TC-002
	Example of a One-Lane, Two-Way Traffic Taper	TC-003
	Use of Hand-Signaling Devices by Flaggers	TC-004
	Regulatory Signs in Temporary Traffic Control Zones	TC-005
	Warning Signs in Temporary Traffic Control Zones	TC-006
	Warning Signs in Temporary Traffic Control Zones	TC-007
	Warning Signs in Temporary Traffic Control Zones	TC-008
	Warning Signs in Temporary Traffic Control Zones	TC-009
	Warning Signs in Temporary Traffic Control Zones	TC-010
	Meaning of Symbols on Typical Application Diagrams	TC-011
	Key Reference Materials	TC-012
	Speed Reduction Set-up	TC-013
	Delineation for Changeable Message Signs/ Light Stations	TC-014
Road Work	Work Beyond the Shoulder	TC-100
	Short-Duration or Mobile Operation on Shoulder	TC-101
	Shoulder Work with Minor Encroachment	TC-102
	Mailbox Installation on Shoulder	TC-103
	Mailbox Installation on Far Side of Intersection – Major Roadway	TC-104
	Mailbox Installation on Far Side of Intersection – Minor Roadway	TC-105
	Road Narrows	TC-106
	Sidewalk Repair	TC-107
	Lane Closure on Two-Lane Road Using Flaggers	TC-200a
	Lane Closure on Two-Lane Road Using Flaggers	TC-200b
	Road Closure Signing (Hard Closures) (Arterial/Collector Road)	TC-201a
	Road Closure Signing (Hard Closures) (Local Road)	TC-201b
	Road Closure Signing (Soft Closures) (Arterial/Collector Road)	TC-202a
	Road Closure Signing (Soft Closures) (Local Road)	TC-202b
	Turn Lane Treatments for Hard Closure	TC-203
	Lane Closure on Near Side of Intersection	TC-204
	Right Lane Closure on Far Side of Intersection	TC-205
	Left Lane Closure on Far Side of Intersection	TC-206
Half Road Closure on Far Side of Intersection	TC-207	
Multiple Lane Closures at Intersections	TC-208	

Type	Title	Detail #
	Closure in Center of Intersection	TC-209
	Closure at Side of Intersection	TC-210
	Interior Lane Closure on Multi-lane Street	TC-211
	Double Lane Closure on Multi-lane Road	TC-212
	Interior Lane Closure on Multi-lane Roadway	TC-213
	Turn Lane Closure at a Signalized Intersection	TC-214
	Lane Closure at a Signalized Intersection 4 Lane 2 Way Traffic	TC-215
	Center Lane Closure on Near Side of Intersection	TC-216
	Right Lane Closure on Far Side of Intersection (Through Road)	TC-217
	Right Lane Closure on Near Side of Intersection (Side Road)	TC-218
	Right Lane Closure on Near Side of Intersection (Through Road)	TC-219
	Multiple Lane Closure at Intersection	TC-220
	Center Lane Closure on Multi-Lane Road	TC-221
	Center Turn Lane Closure	TC-222
	Lane Shift on Three-Lane, Two-Way Road	TC-223
	Work in Center of Road with Low Traffic Volumes	TC-224
	Mobile Operations on Two-Lane Road	TC-225
Surveying	Residential Street	TC-300
	Closure in Center of Intersection with 4-Way Stop	TC-301
	Closure in Center of Intersection with Signal	TC-302
	Temporary Road Closure	TC-303
	Left Lane Closure on Multi-lane Street	TC-304
	Right Lane Closure on Multi-lane Street	TC-305
Traffic Operations	Crosswalk Striping Mid-Block Crossing	TC-400
	Lane Closure on Two-Lane Road Using Flaggers (Speed Less than 40 mph)	TC-401
	Lane Closure on Two-Lane Road Using Flaggers (Speed Greater than 45 mph)	TC-402
	Crosswalk Striping at an Intersection	TC-403
	Stationary Lane Closure on Divided Highway (Interior Closure)	TC-404
	Stationary Lane Closure on Divided Highway (Exterior Closure)	TC-405
	Tree Trimming	TC-406
	24-48 Hrs Road Closure at River Crossing – Type II Barricades	TC-407a
	Longer than 48 Hrs Road Closure at River Crossing	TC-407b
	Tree Trimming on Shoulder	TC-408
	Closure at Roundabout (Overall Set-up)	TC-409a
	Closure at Roundabout (Detailed Set-up)	TC-409b
	Clearing or Tree Trimming at the Intersection	TC-410
	Emergency Response Right and Left Lane Closures (Less than 48 Hrs)	TC-411
	Typical Pilot Car Set-up for Chip Seal	TC-412
Interior Local Streets Chip Seal	TC-413	

9.2. Forms

MCDOT has developed specific forms for use when submitting requests for temporary traffic control. These forms are provided in Appendix B.

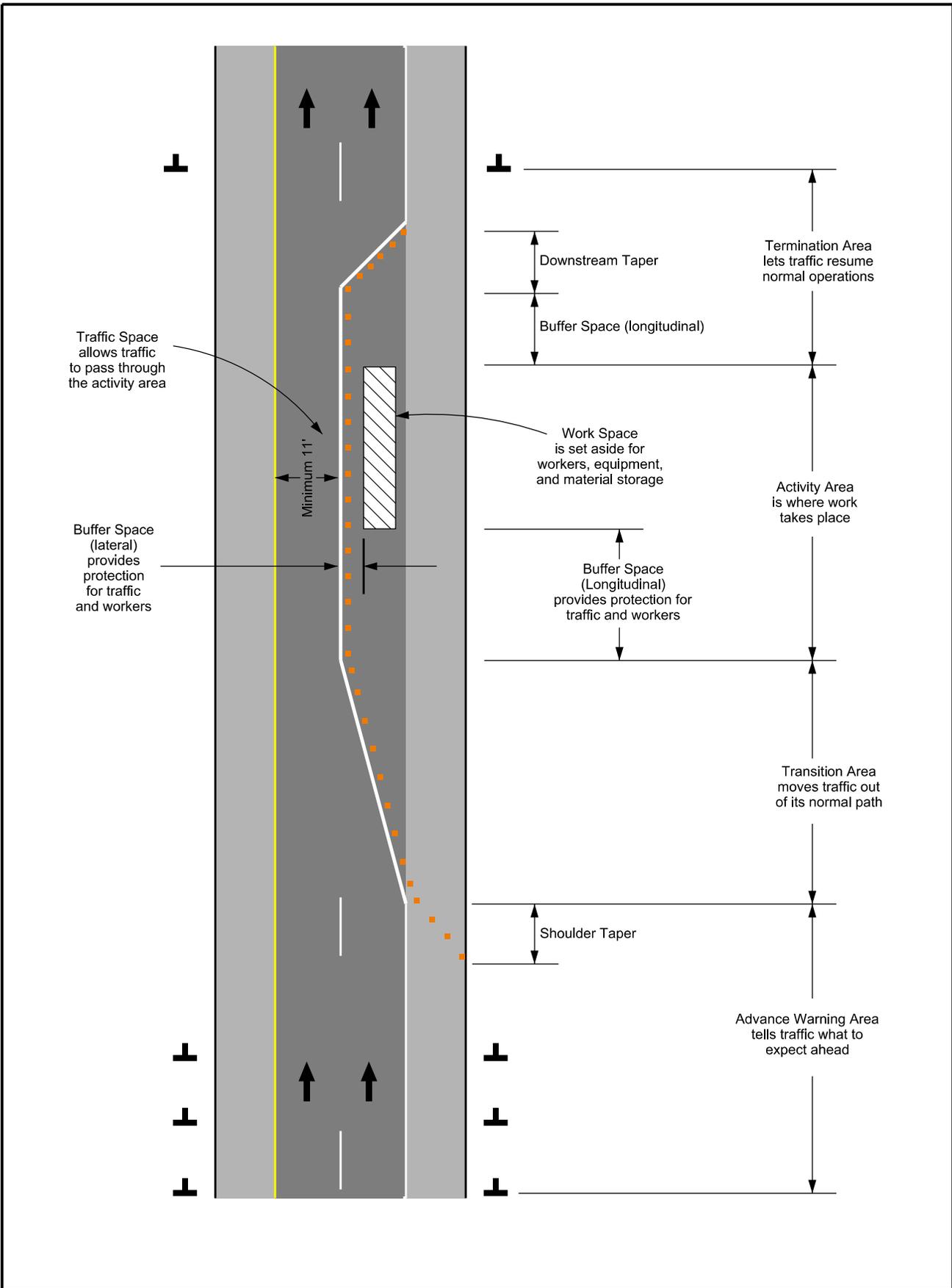
Appendices

10. Appendix A

10.1. Typical Applications

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Double Lane Closure on Multi-lane Road	TC-212	

Type	Title	Detail #
	Interior Lane Closure on Multi-lane Roadway	TC-213
	Turn Lane Closure at a Signalized Intersection	TC-214
	Lane Closure at a Signalized Intersection 4 Lane 2 Way Traffic	TC-215
	Center Lane Closure on Near Side of Intersection	TC-216
	Right Lane Closure on Far Side of Intersection (Through Road)	TC-217
	Right Lane Closure on Near Side of Intersection (Side Road)	TC-218
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Component Parts of a Temporary Traffic Control Zone

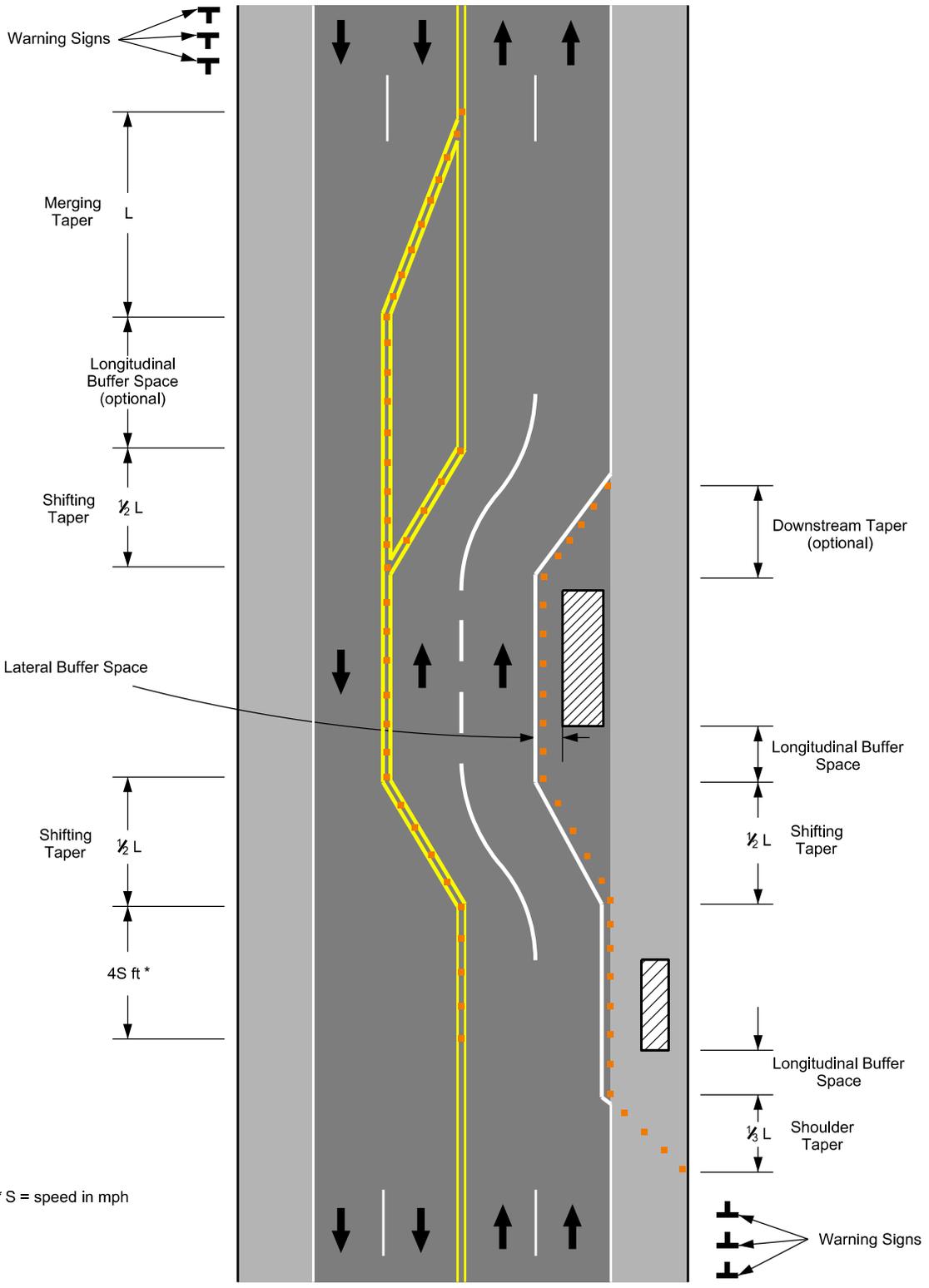
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TRAFFIC MANAGEMENT DIVISION

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TC-001



Types of Tapers and Buffer Spaces

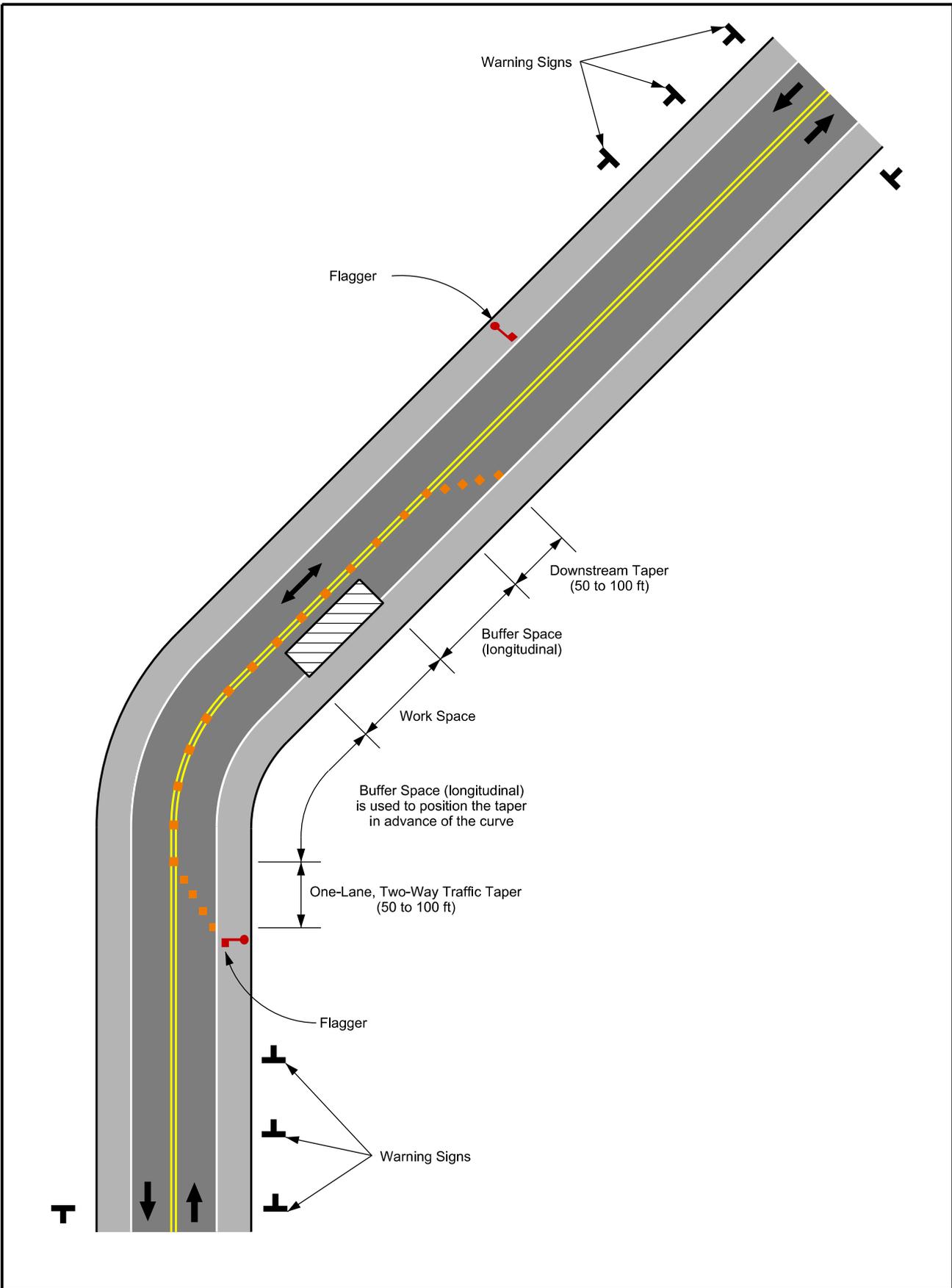
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DATE

9/15

PAGE

TC-002



Example of a One-Lane, Two-Way Traffic Taper

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

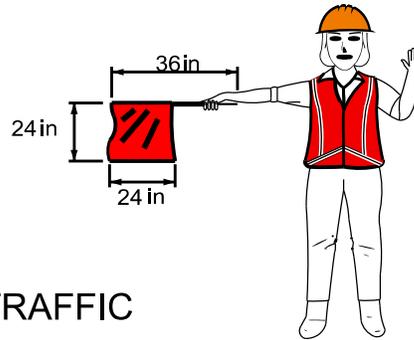
9/15

PAGE

TC-003

**PREFERRED METHOD
STOP/SLOW Paddle**

**EMERGENCY SITUATIONS ONLY
Red Flag**



TO STOP TRAFFIC



TO LET
TRAFFIC PROCEED



TO ALERT AND
SLOW TRAFFIC



**Use of Hand-Signaling
Devices by Flaggers**

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

PAGE

9/15

TC-004



R1-1-xx



R1-2-xx



R3-1



R3-2



R3-5-R (L)



R3-7-R (L)



R4-7a



R4-7b



R4-8a



R4-8b



R5-1



R6-1-R (L)



R9-8



R9-9



R9-11



R9-11a



R11-2

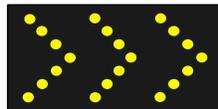


R11-3a



R11-4

Advance Warning Arrow Display



MERGE
RIGHT



MERGE
LEFT



MERGE
RIGHT OR LEFT



ALTERNATING DIAMOND CAUTION



CAUTION



Temporary Traffic Control Signs

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-005



G20-1



G20-2



G20-4



G20-4b



M4-8



M4-8a



M4-8b



M4-9-R (L)



M4-9-S



M4-10-R (L)



M4-10-d



M5-101



M5-102



M5-103



W1-1-R (L)



W1-2-R (L)



W1-3-R (L)



W1-4-R (L)



W1-4b-R (L)



W1-4c-R (L)



W1-5-R (L)



W1-6-R (L)



W1-7



W1-8-R (L)



W3-1



W3-2



W3-3



W3-4



W3-5a



W4-1-R (L)



W4-2-R (L)



W4-3-R (L)



Temporary Traffic Control Signs

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-006



W4-5



W4-6



W5-1



W5-2



W5-3



W6-1



W6-2



W6-3



W6-4



W7-1



W7-3aP



W7-3cP



W7-8



W8-1



W8-2



W8-3



W8-4



W8-5



W8-6



W8-7



W8-8



W8-8a



W8-8b



W8-9



W8-11



W8-12



W8-17-R (L)



W8-18b



W8-24



W8-26



W8-106



Temporary Traffic Control Signs

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-007



W9-1-R (L)



W9-2-R (L)



W9-3



W9-101R (L)



W11-10



W12-1



W12-2



W12-101



W13-110



W13-115



W13-120



W13-125



W13-130



W13-135



W13-140



W13-145



W13-150



W14-3



W15-2a



W15-2b



W15-2c



W15-2d



W15-2e



W15-2f



W20-1



W20-1a



W20-1b



W20-1c



W20-1d



W20-1e



W20-2



W20-2a



W20-2b



W20-2c



Temporary Traffic Control Signs

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-008



W20-2d



W20-2e



W20-3



W20-3a



W20-3b



W20-3c



W20-3d



W20-3e



W20-4



W20-4a



W20-4b



W20-4c



W20-4d



W20-4e



W20-5aR (L)



W20-5R (L)



W20-5Ra (L)



W20-5Rb (L)



W20-5Rc (L)



W20-5Rd (L)



W20-5Re (L)



W20-7



W21-1



W21-2



W21-3



W21-5



W21-5aR (L)



W21-5bR (L)



W21-5cR (L)



W21-5dR (L)



Temporary Traffic Control Signs

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-009



W21-5eR (L)



W21-7



W21-7a



W21-7b



W21-7c



W21-7d



W21-7e



W21-101



W22-1



W22-2



W22-3



W24-1-R (L)



W24-1aR (L)



W24-1bR (L)



W24-1cP



W30-1



W40-1



W40-1a



Temporary Traffic Control Signs

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

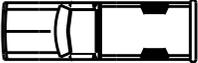
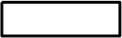
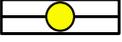
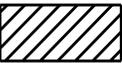
DATE

9/15

PAGE

TC-010

Table 6H-2

	Arrow board
	Arrow board support or trailer (shown facing down)
	Changeable message sign or support trailer
	Channelizing device
	Crash Cushion
	Direction of temporary traffic detour
	Direction of traffic
	Flagger
	Luminaire
	Pavement markings that should be removed for a long-term project
	Shadow vehicle
	Sign (shown facing left)
	Surveyor
	Temporary barrier
	Temporary barrier with warning lights
	Traffic or Pedestrian signal
	Truck-mounted attenuator
	Type III Barricade
	Warning lights
	Work space
	Work vehicle



Meaning of Symbols on Typical Application Diagrams

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-011



Key Reference Materials

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-012

Table 6H-3
Recommended Advance Warning
Sign Minimum Spacing

Road Type	Distance Between Signs **		
	A	B	C
Urban (low speed) *	100 feet	100 feet	100 feet
Urban (high speed) *	350 feet	350 feet	350 feet
Rural	500 feet	500 feet	500 feet

* Speed category to be determined by highway agency
 ** The column headings A, B, and C are the dimensions shown in Pages **IC-012** through **IC-239**. The A dimension is the distance from the transition or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The "first sign" is the sign in a three-sign series that is closest to the TTC zone. The "third sign" is the sign that is furthest upstream from the TTC zone.)

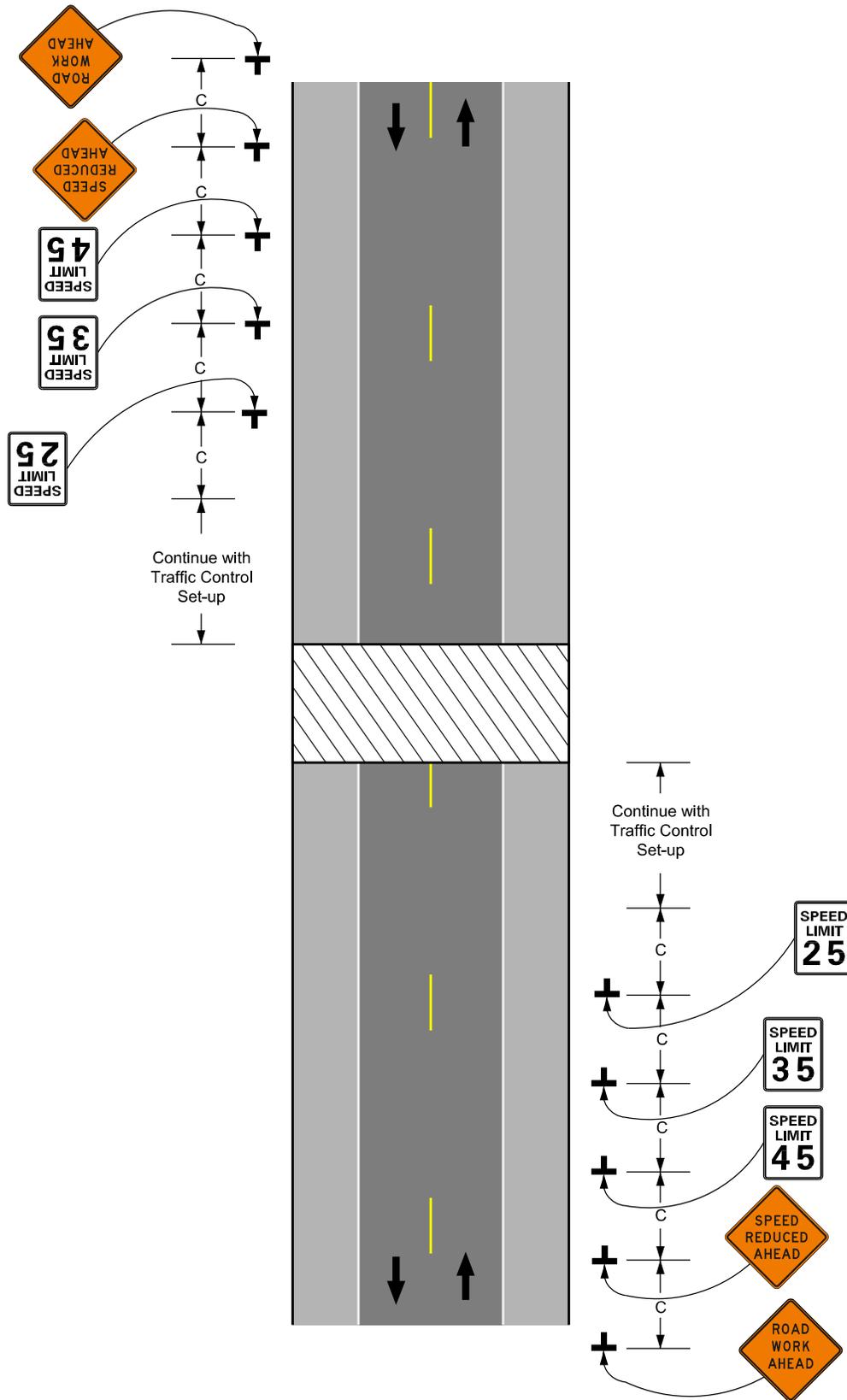
Table 6H-4
Formulas for Determining
Taper Length

Speed Limit (S)	Taper Length (L) Feet
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or more	$L = WS$

L = Taper Length (feet)
 W = Width of Lane (feet)
 S = Posted Speed Limit

Speed Limit (mph)	Sign Spacing (ft)	Max. Device Spacing in Taper (ft)	Min.# of Devices in Taper (ft)+	Shoulder Taper (1/3 L) (ft)+	Shifting Taper (1/2 L) (ft)+	Merging Taper Lane Width					Tangent (2L)					Buffer Length- Stopping Sight Distance (ft)	Downstream Taper (ft)	
						10 ft	11 ft	12 ft	13 ft	14 ft	10 ft	11 ft	12 ft	13 ft	14 ft			
Urban (Low Speed)	25	100	25	65	45	65	105	115	125	135	145	210	230	250	270	290	155	100
	30	100	30	90	60	90	150	165	180	195	210	300	330	360	390	420	200	100
	35	100	35	125	85	125	205	225	245	265	285	410	450	490	530	570	250	100
Urban (High Speed)	40	350	40	160	110	160	270	295	320	345	375	540	590	640	690	750	305	100
	45	350	45	270	170	270	450	495	540	585	625	900	990	1080	1170	1250	360	100
	30	500	30	90	60	90	150	165	180	195	210	300	330	360	390	420	200	100
Rural	35	500	35	125	85	125	205	225	245	265	285	410	450	490	530	570	250	100
	40	500	40	160	110	160	270	295	320	345	375	540	590	640	690	750	305	100
	45	500	45	270	170	270	450	495	540	585	625	900	990	1080	1170	1250	360	100
	50	500	50	300	200	300	500	550	600	650	700	1000	1100	1200	1300	1400	425	100
	55	500	55	330	220	330	550	605	660	705	770	1100	1210	1320	1410	1540	495	100

+ Numbers calculated using a lane width of 12 ft.



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

Note: See TC-013 for Speed Reduction signage and locations.



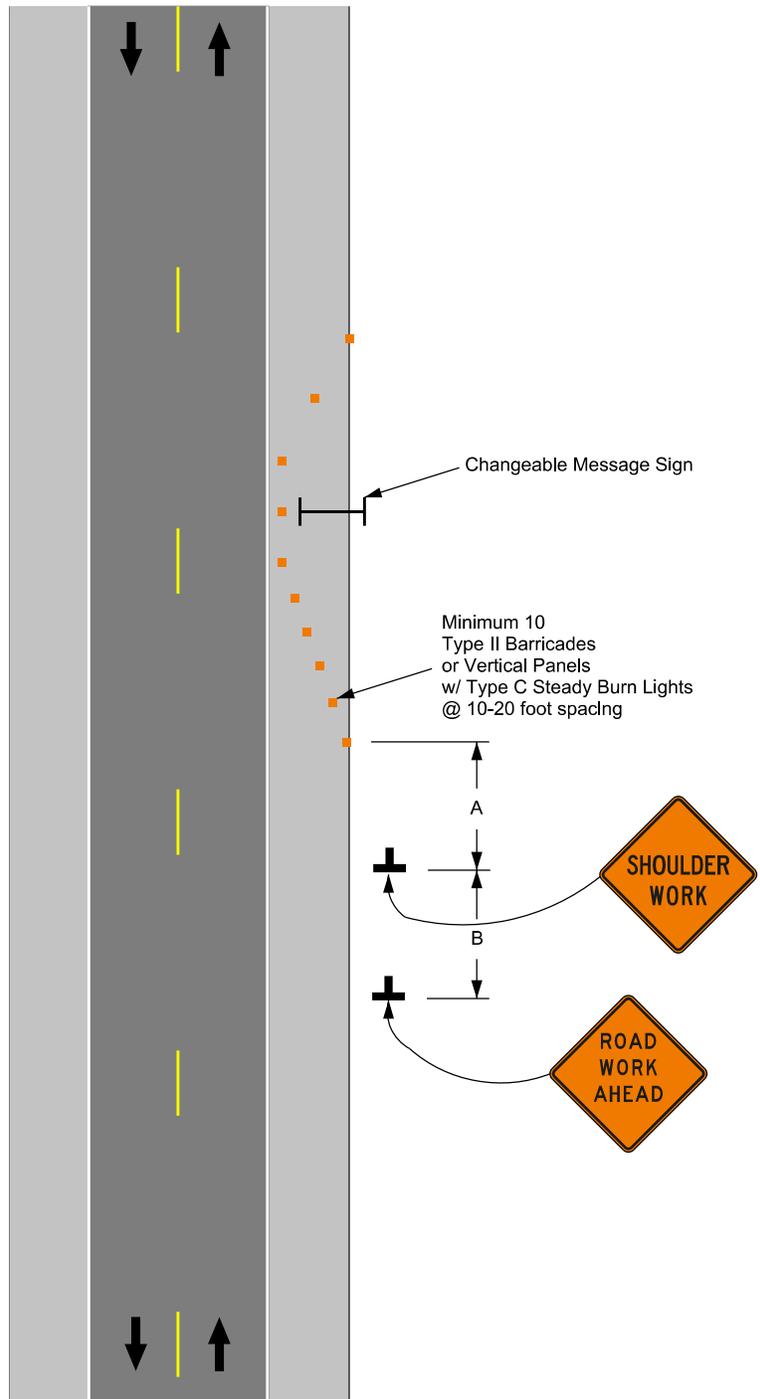
Speed Reduction Set-up

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-013



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

Note: See TC-013 for Speed Reduction signage and locations.



Delineation for Changeable Message Sign/ Light Stations Typical Application

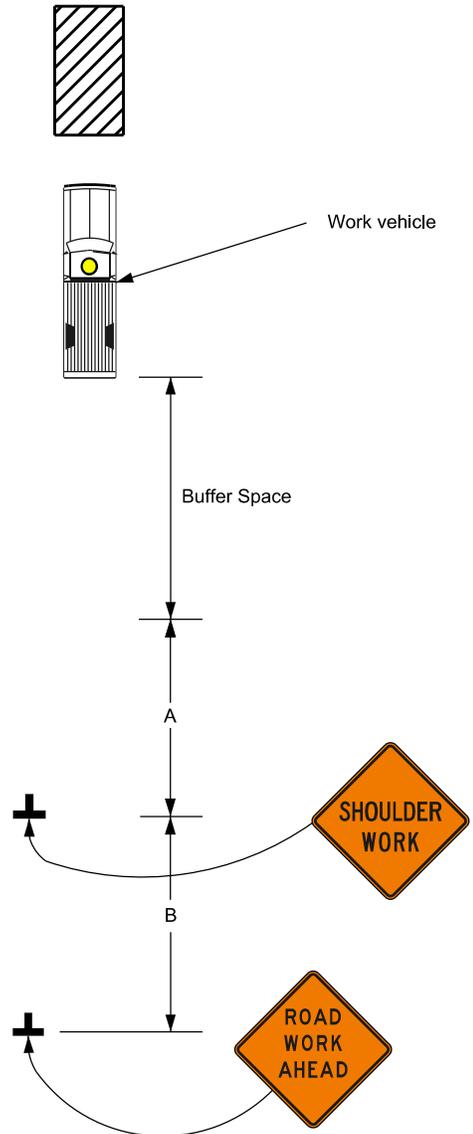
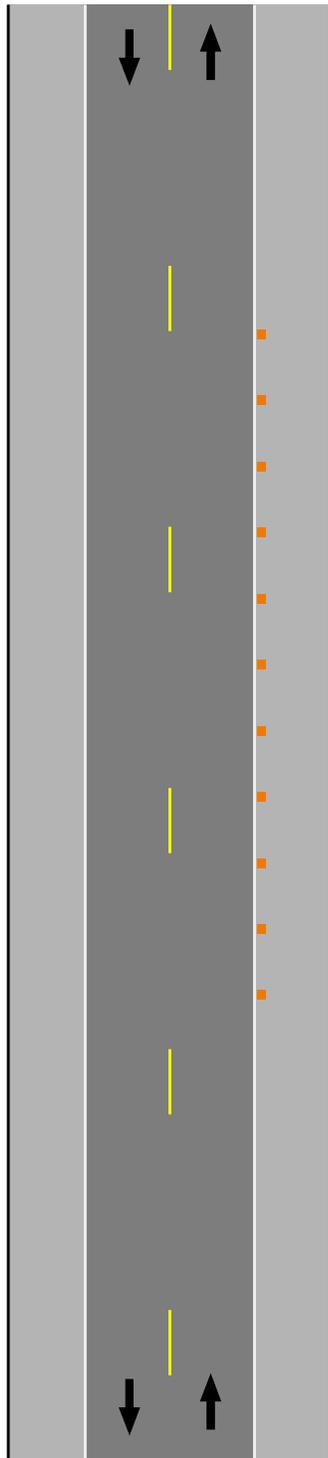
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-014



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

Note: See TC-013 for Speed Reduction signage and locations.



Work Beyond the Shoulder

Typical Application

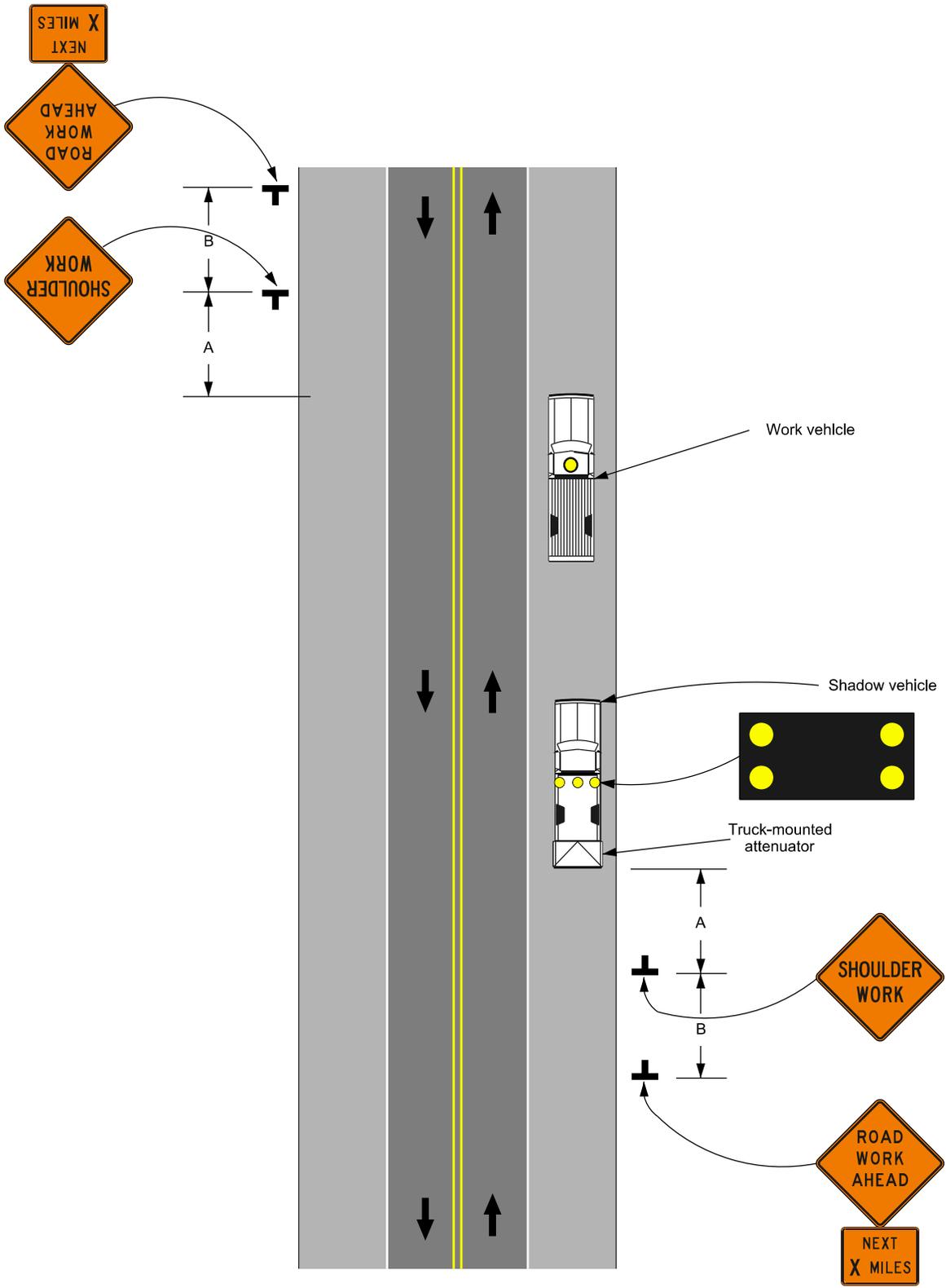
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-100



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

Note: See TC-013 for Speed Reduction signage and locations.



Short Duration or Mobile Operation on Shoulder

Typical Application

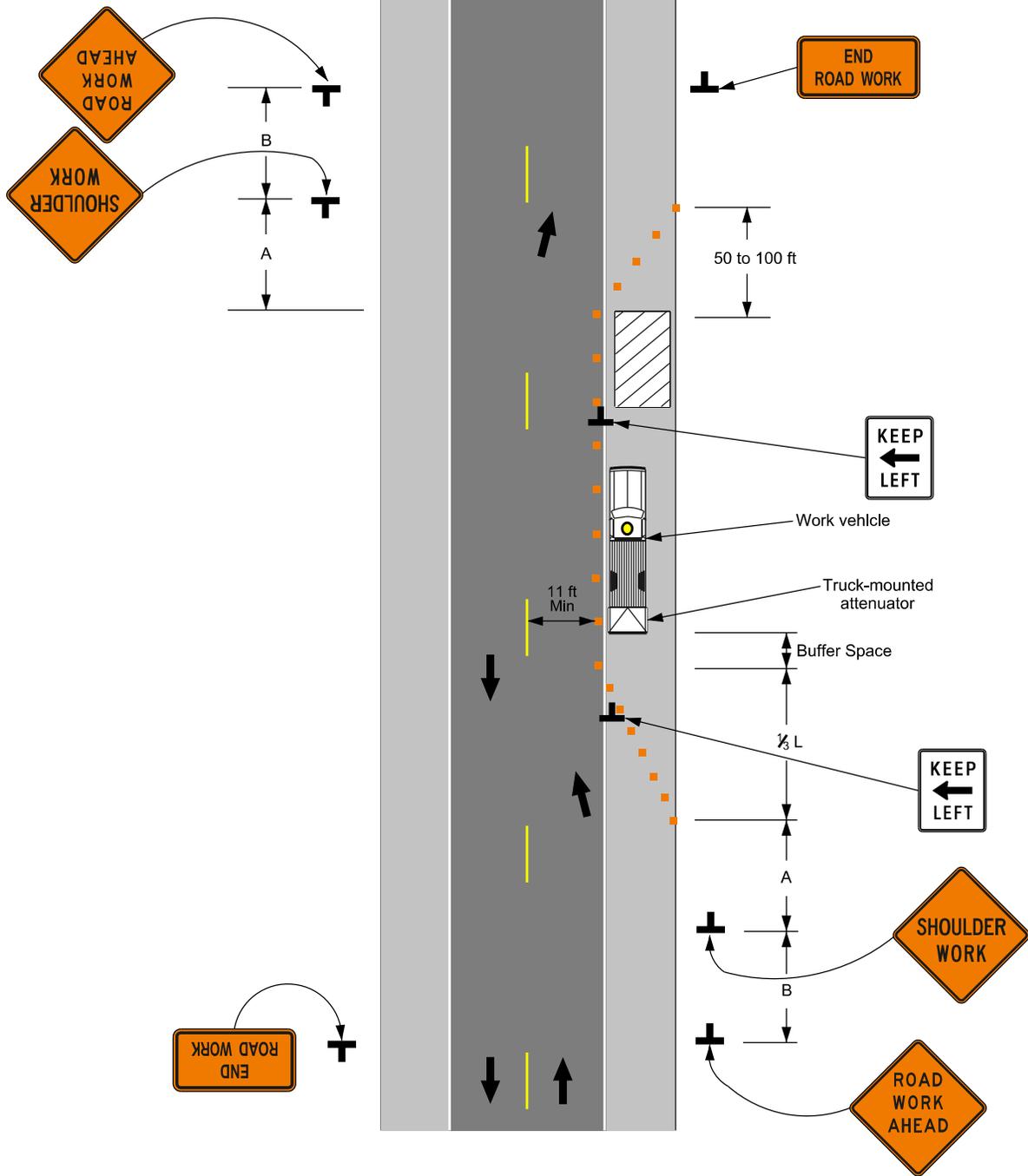
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-101



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

Note: See TC-013 for Speed Reduction signage and locations.



Shoulder Work with Minor Encroachment

Typical Application

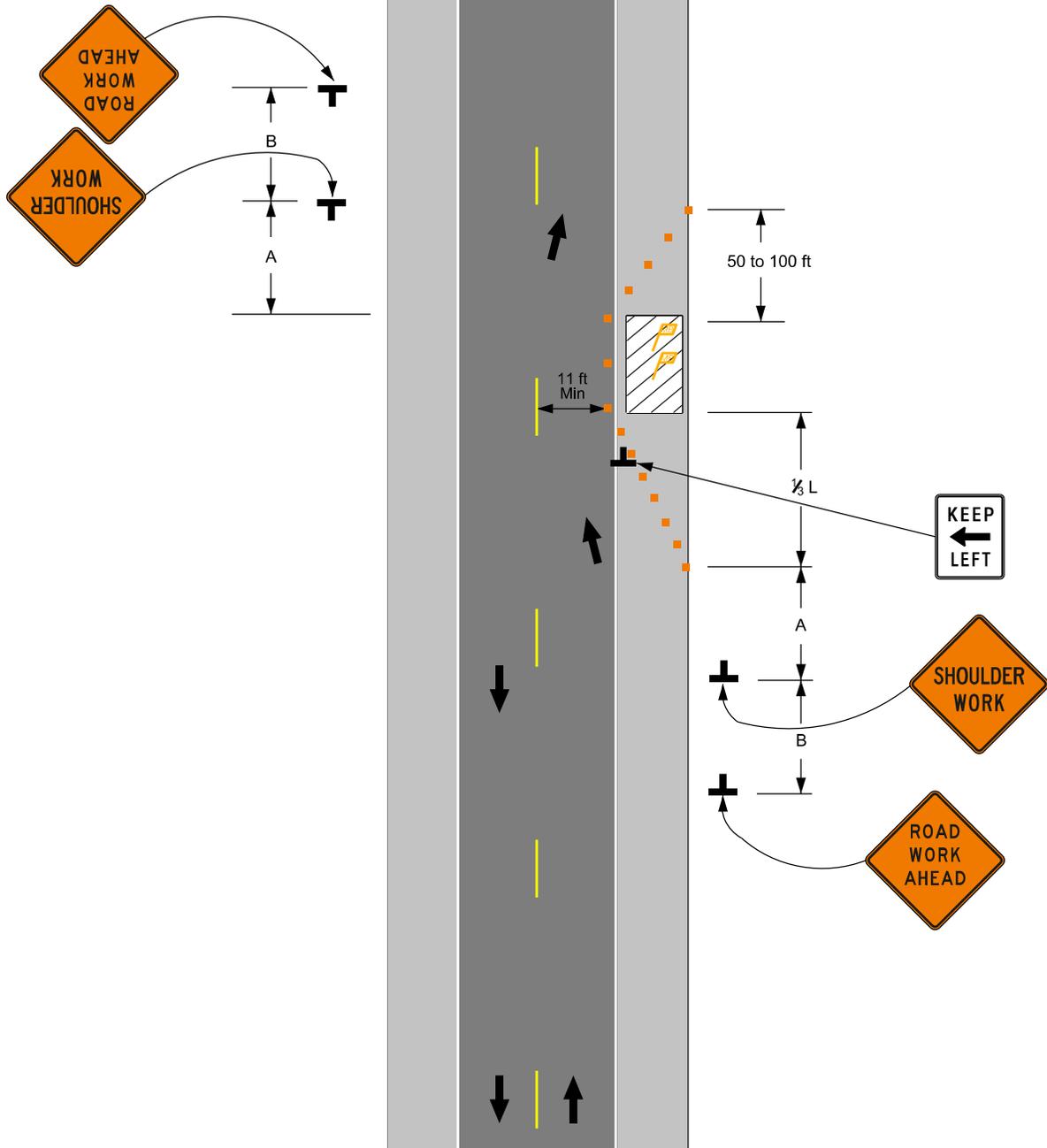
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-102



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

Note: See TC-013 for Speed Reduction signage and locations.



Mailbox Installation on Shoulder

Typical Application

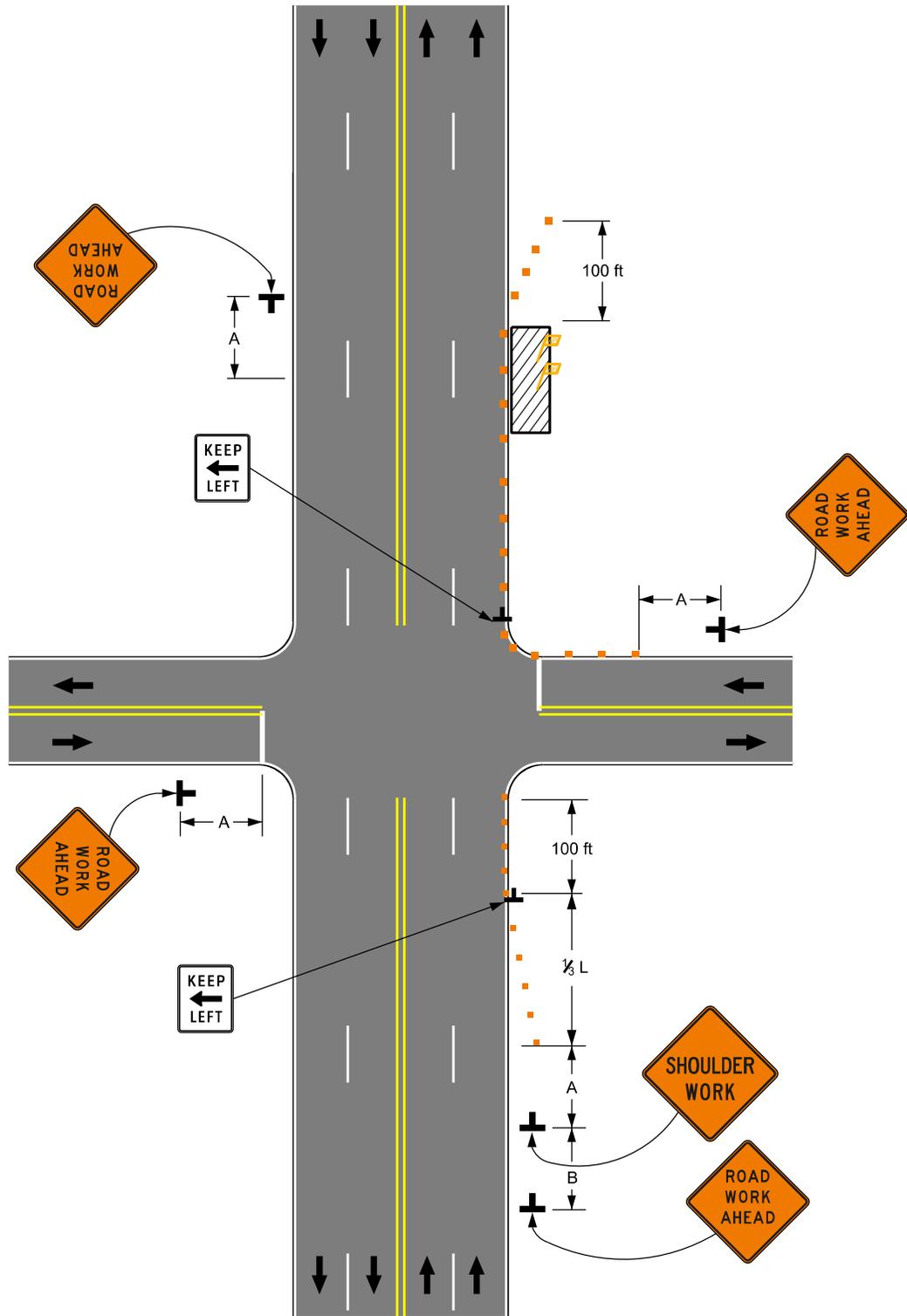
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-103



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

Note: See TC-013 for Speed Reduction signage and locations.



Mailbox Installation on Far Side of Intersection Major Roadway Typical Application

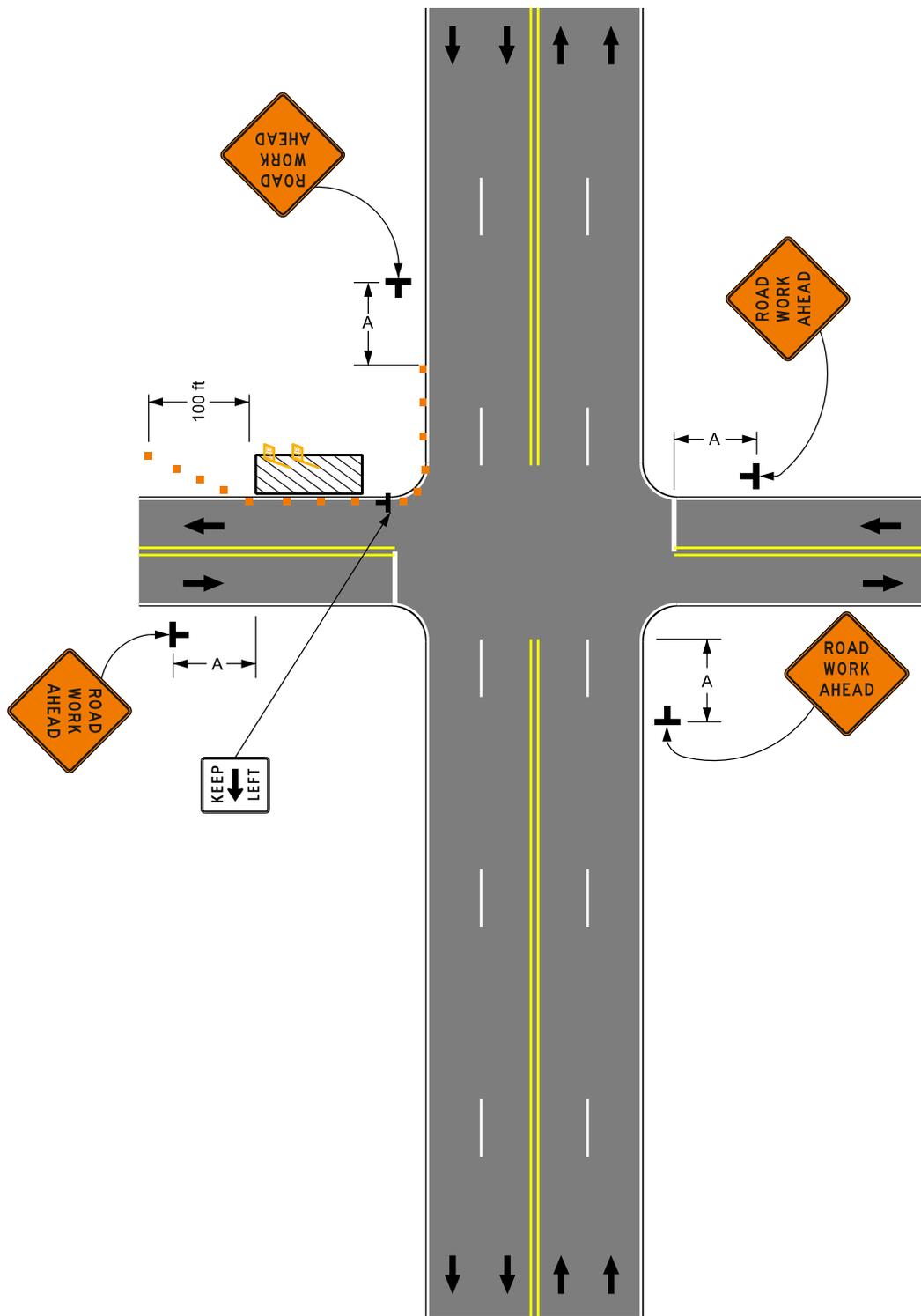
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-104



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

Note: See TC-013 for Speed Reduction signage and locations.

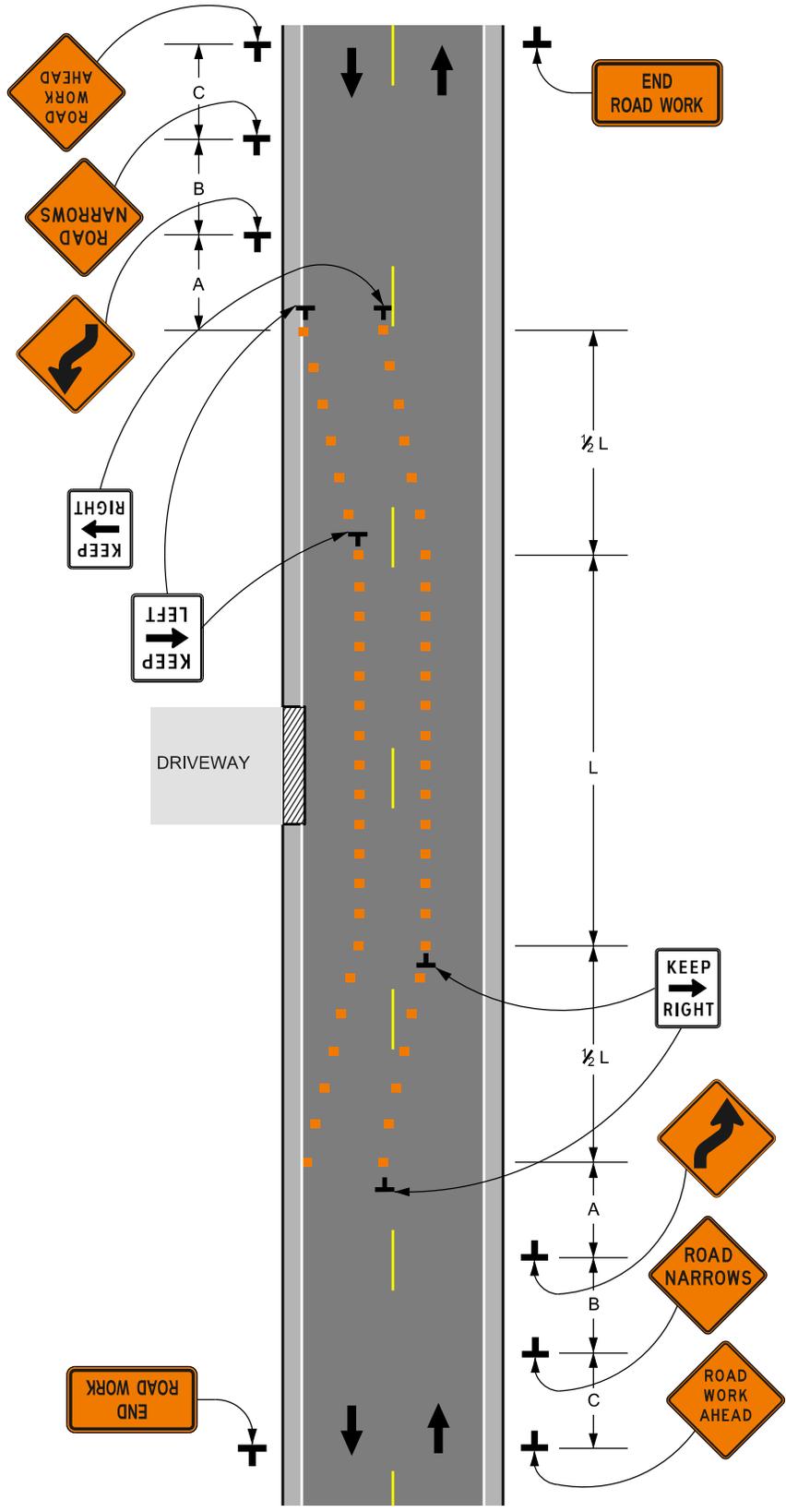


Mailbox Installation on Far Side of Intersection Minor Roadway Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-105



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

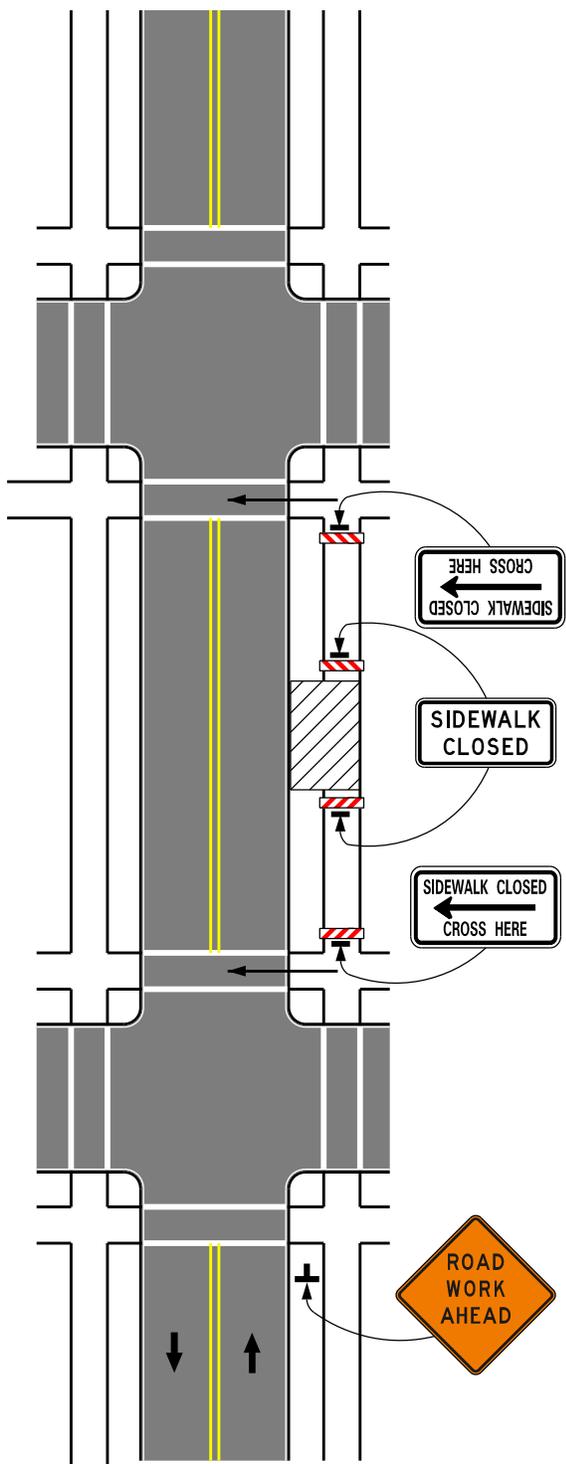
Note: See TC-013 for Speed Reduction signage and locations.



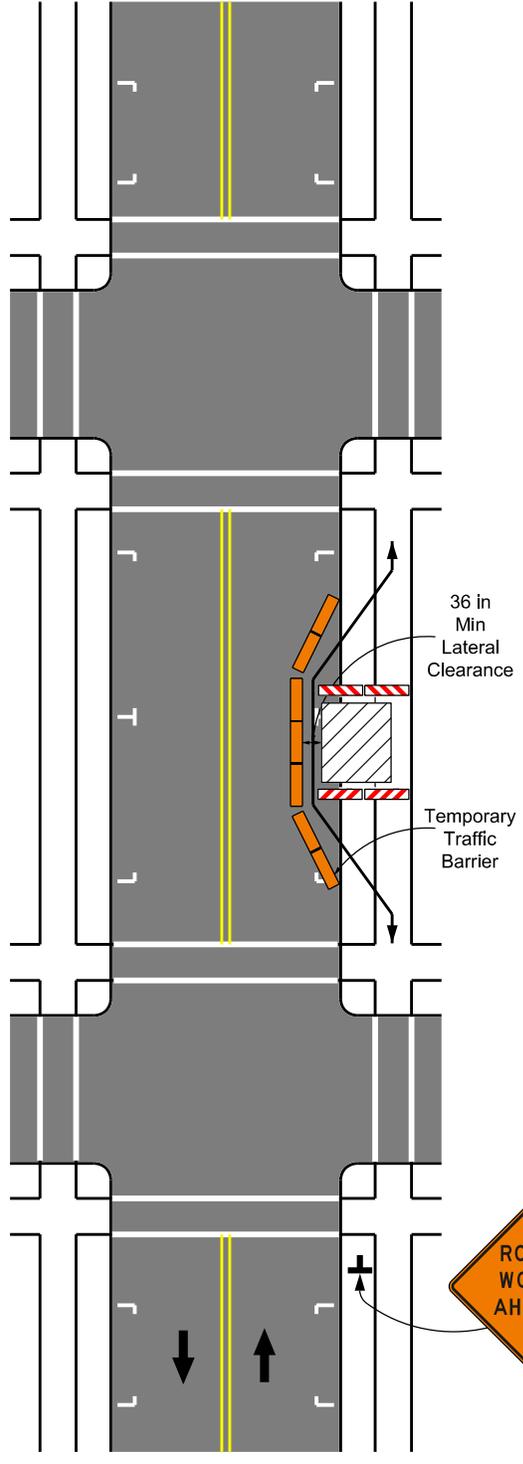
Road Narrows

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION TRAFFIC MANAGEMENT DIVISION	
DATE	PAGE
9/15	TC-106



SIDEWALK DETOUR



SIDEWALK DIVERSION

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



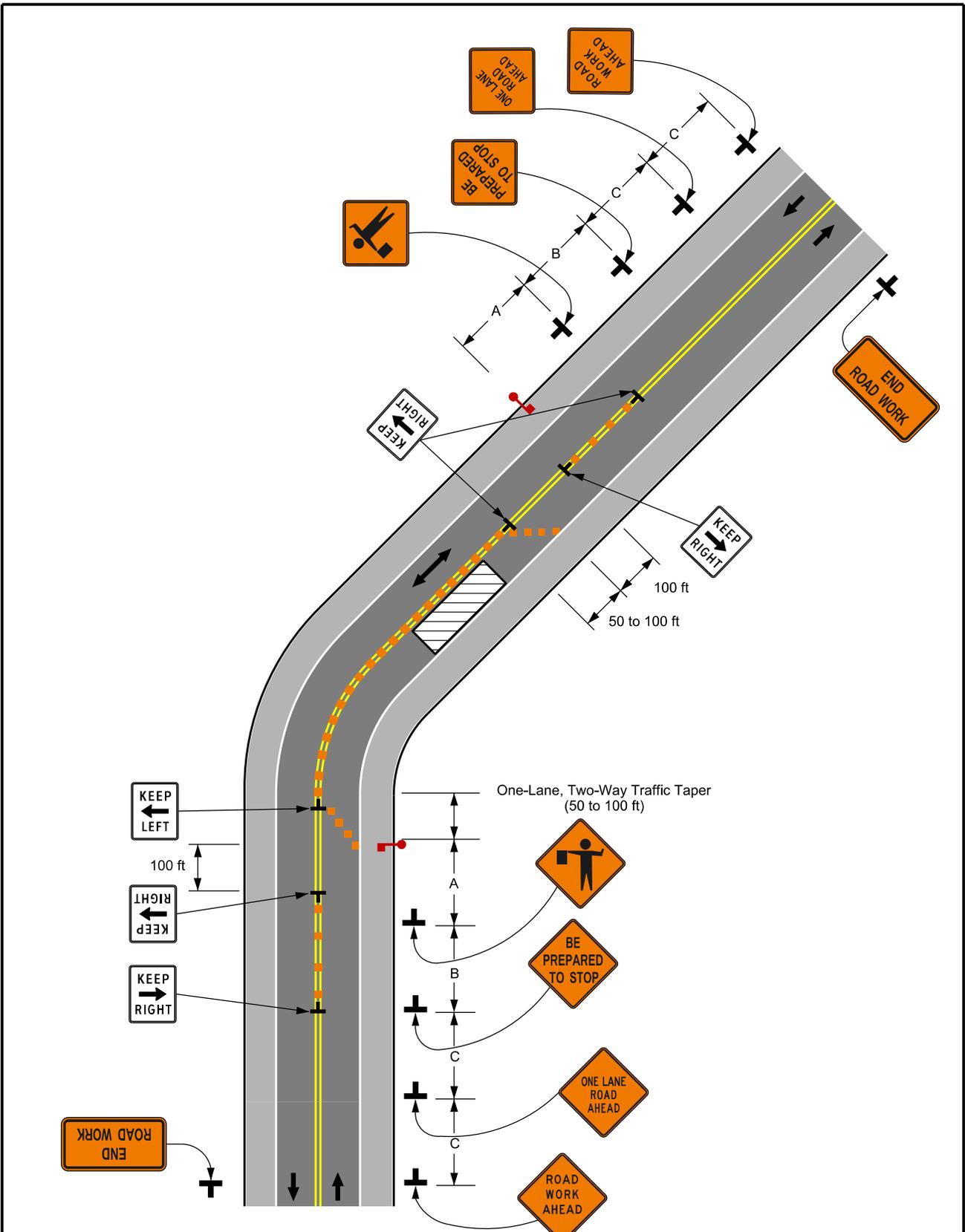
Sidewalk Repair

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-107



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

Note: See TC-013 for Speed Reduction signage and locations.



Lane Closure on Two-Lane Road Using Flaggers

Typical Application

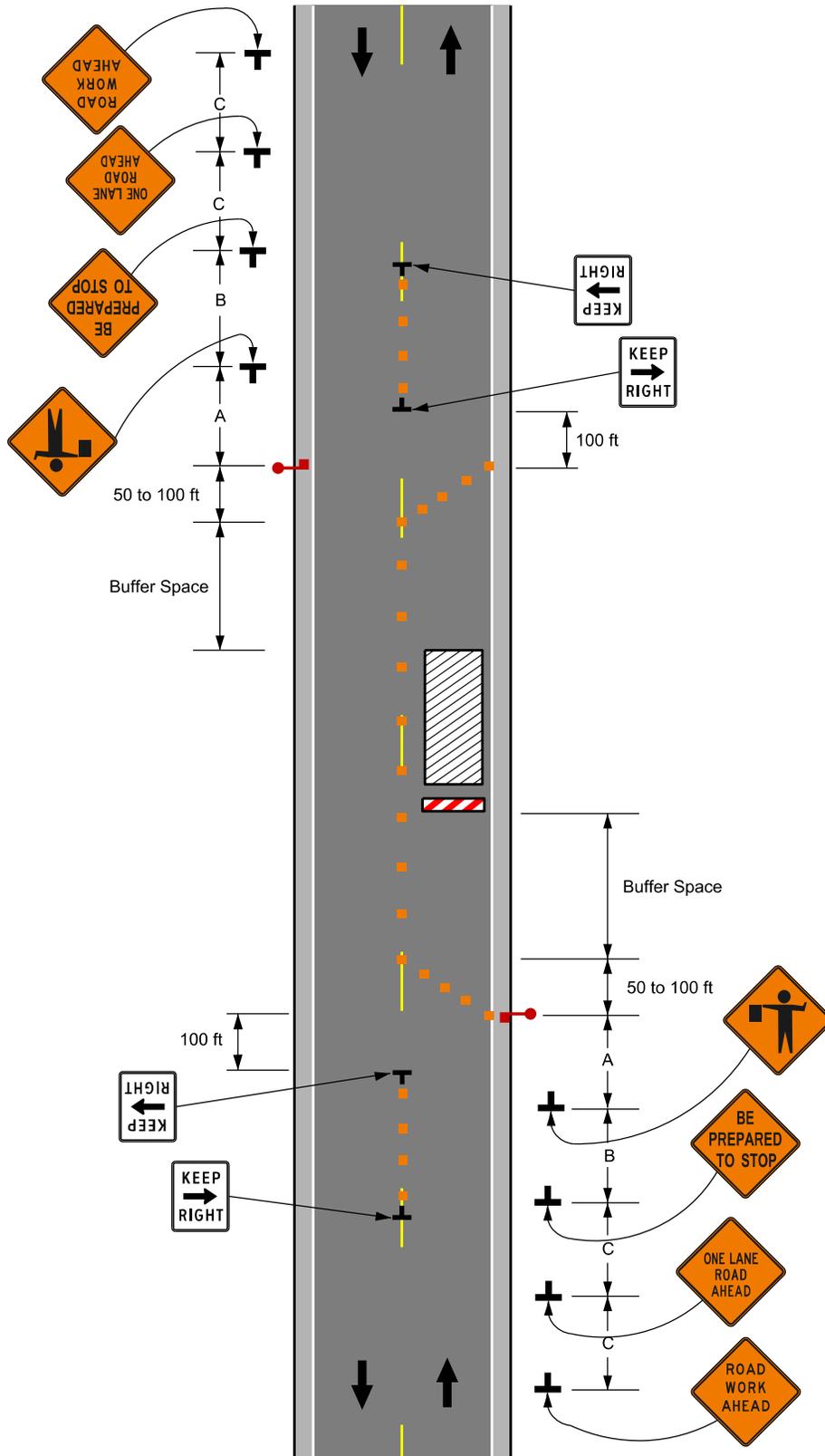
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-200a



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

Note: See TC-013 for Speed Reduction signage and locations.



Lane Closure on Two-Lane Road Using Flaggers

Typical Application

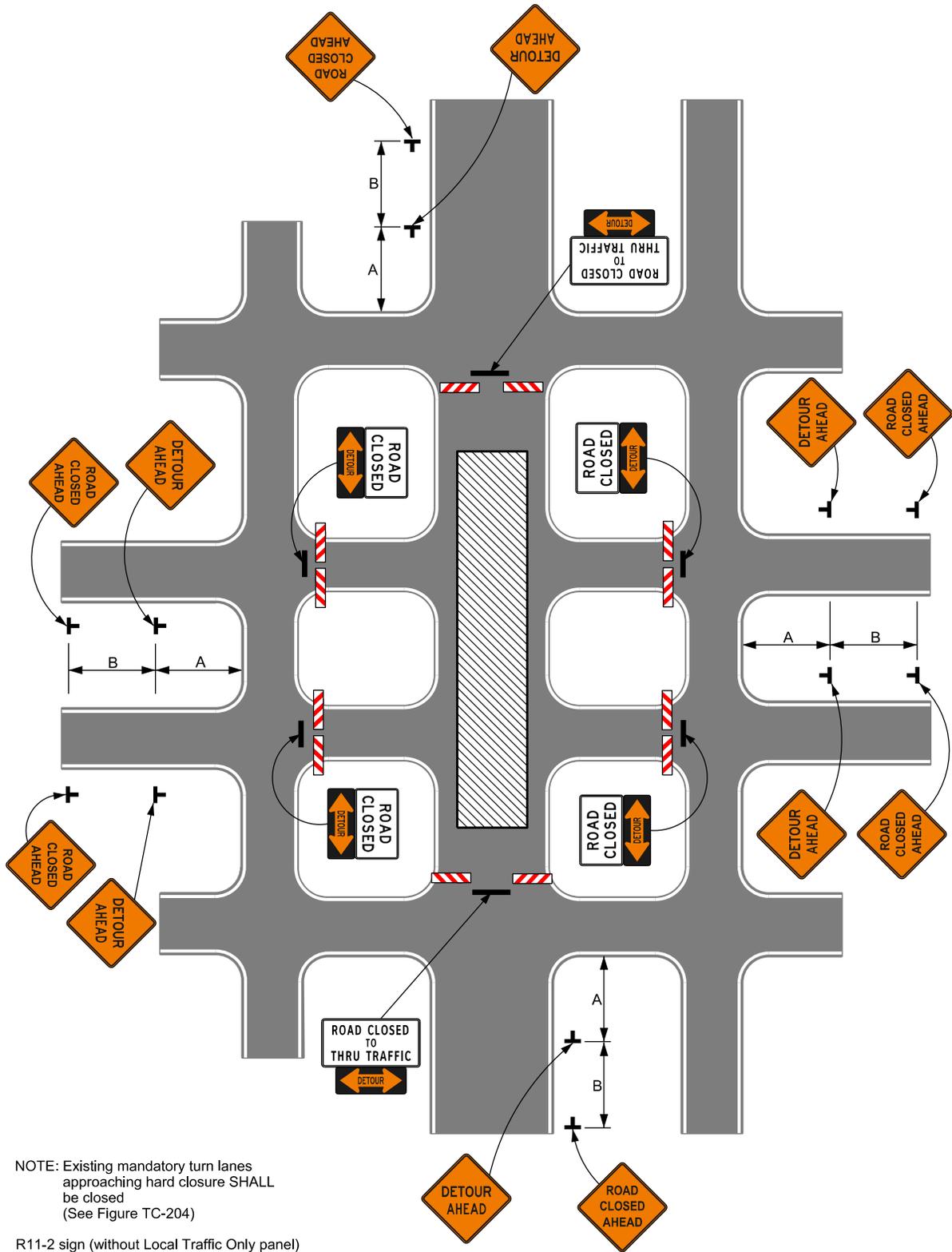
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-200b



(Arterial / Collector Road)



Road Closure Signing (Hard Closure)

Typical Application

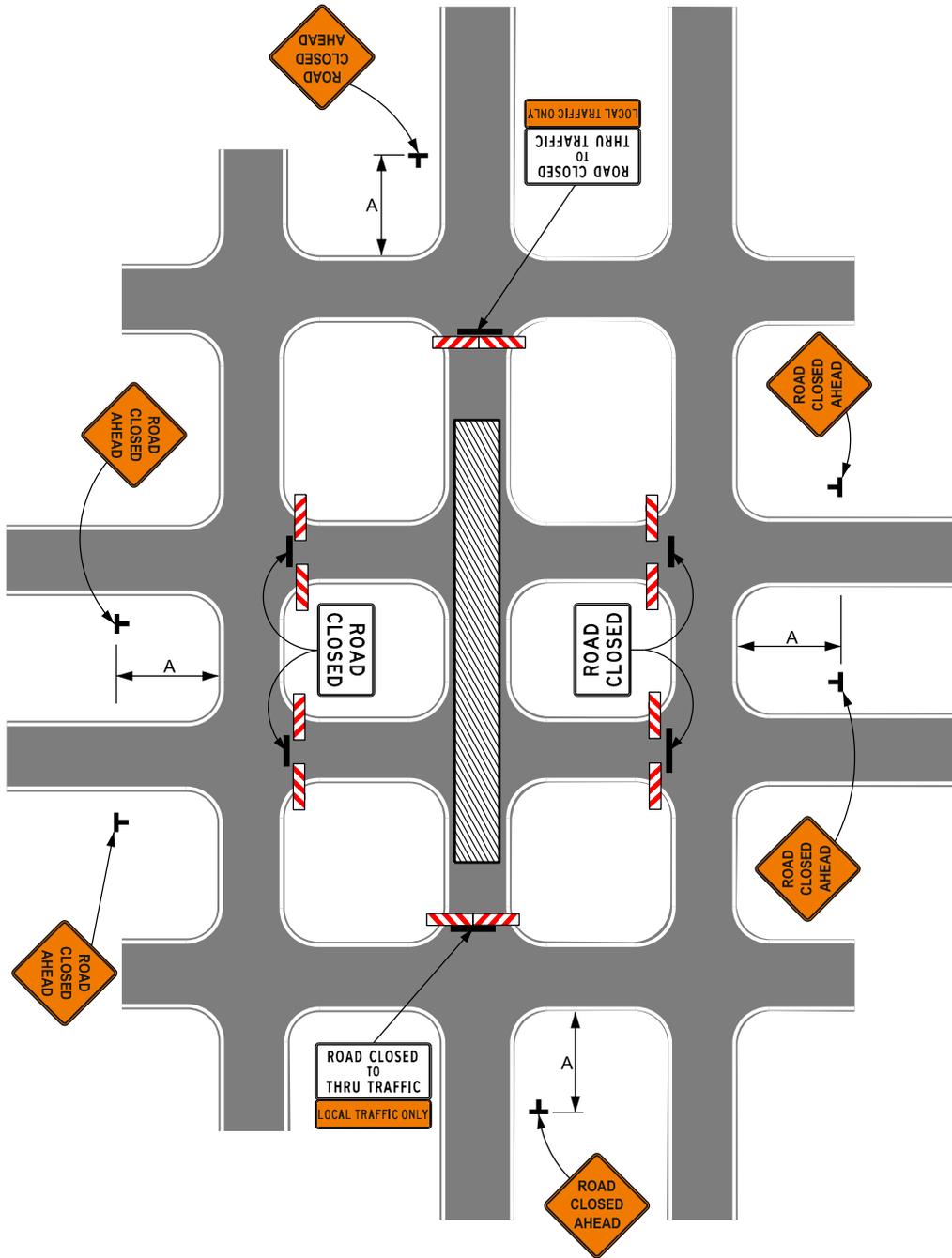
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-201a



NOTE: Existing mandatory turn lanes approaching hard closure SHALL be closed (See Figure TC-204)

R11-2 sign (without Local Traffic Only panel) with Type II barricades to cover the full width of the roadway. To be used for all local hard closures.

(Local Roads)



Road Closure Signing (Hard Closure)

Typical Application

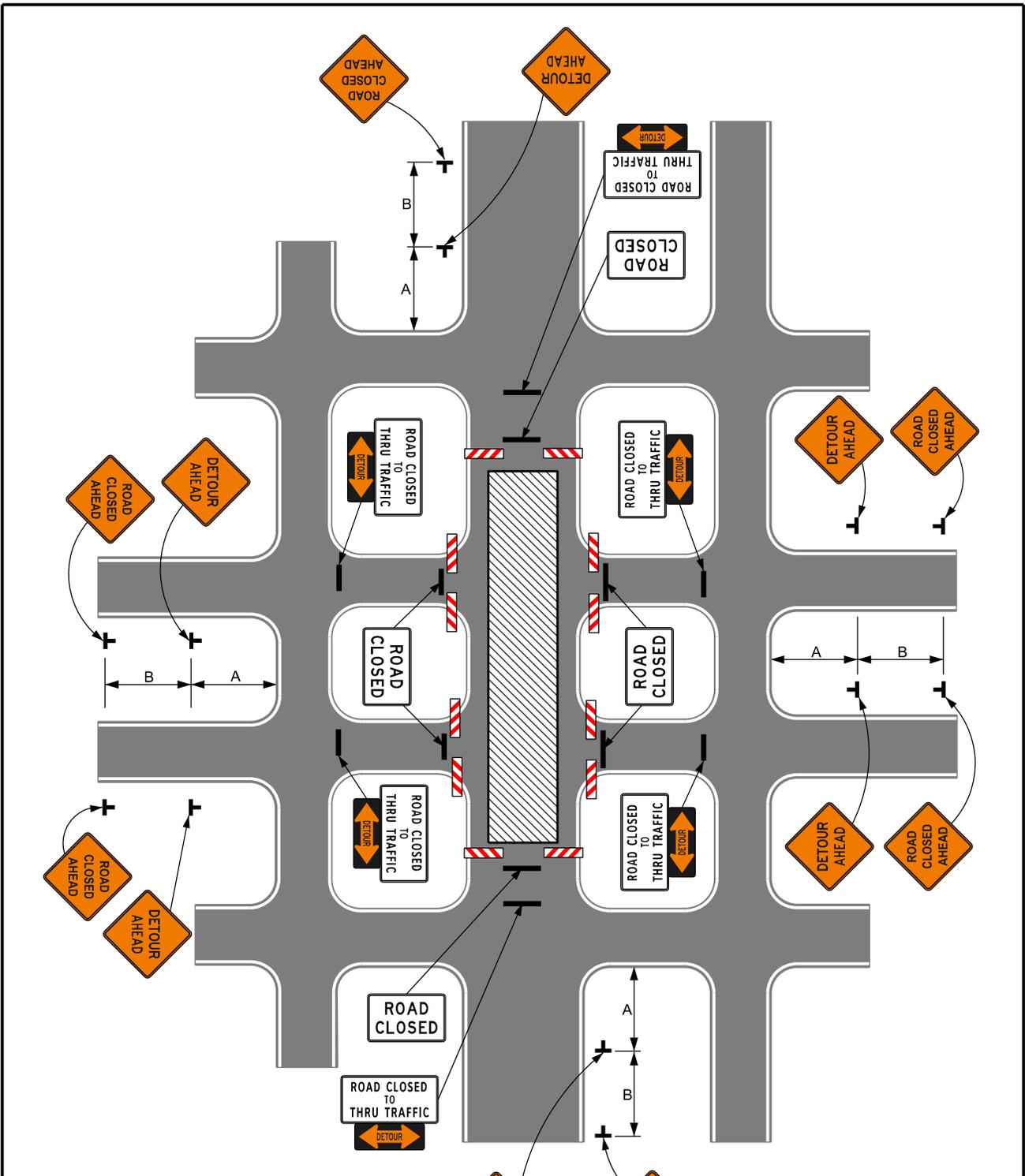
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-201b



NOTE: Existing mandatory turn lanes approaching hard closure SHALL be closed (See Figure TC-204)

R11-4 sign (with To Thru Traffic phase), with Type III barricade. To be used for all major soft closures.

(Arterial / Collector Road)



**Road Closure Signing
(Soft Closure)**

Typical Application

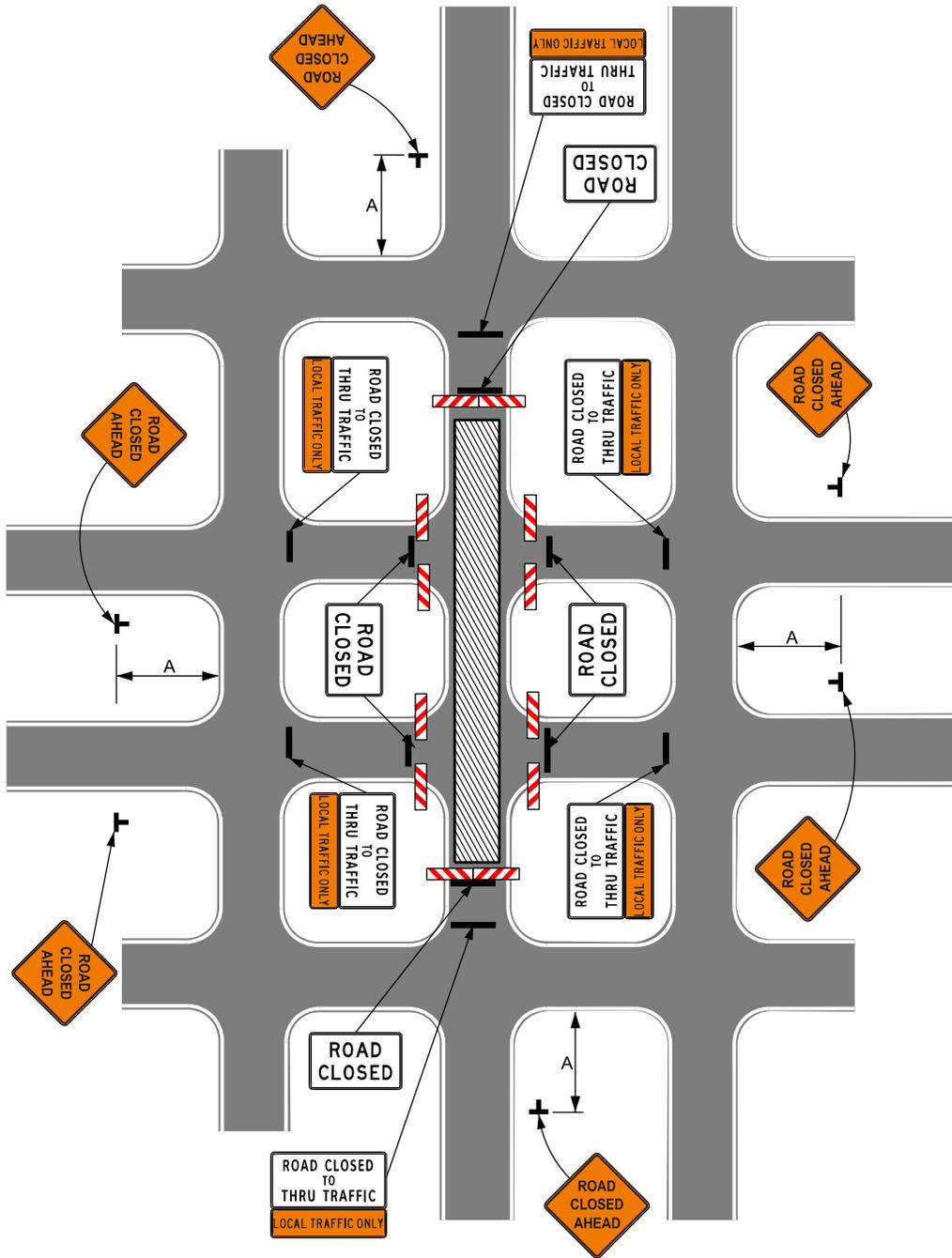
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-202a



NOTE: Existing mandatory turn lanes approaching hard closure SHALL be closed (See Figure TC-204)

R11-2 sign (with Local Traffic Only panel) with Type II barricade, to be used for collector and local soft closures.

(Local Roads)



Road Closure Signing (Soft Closure)

Typical Application

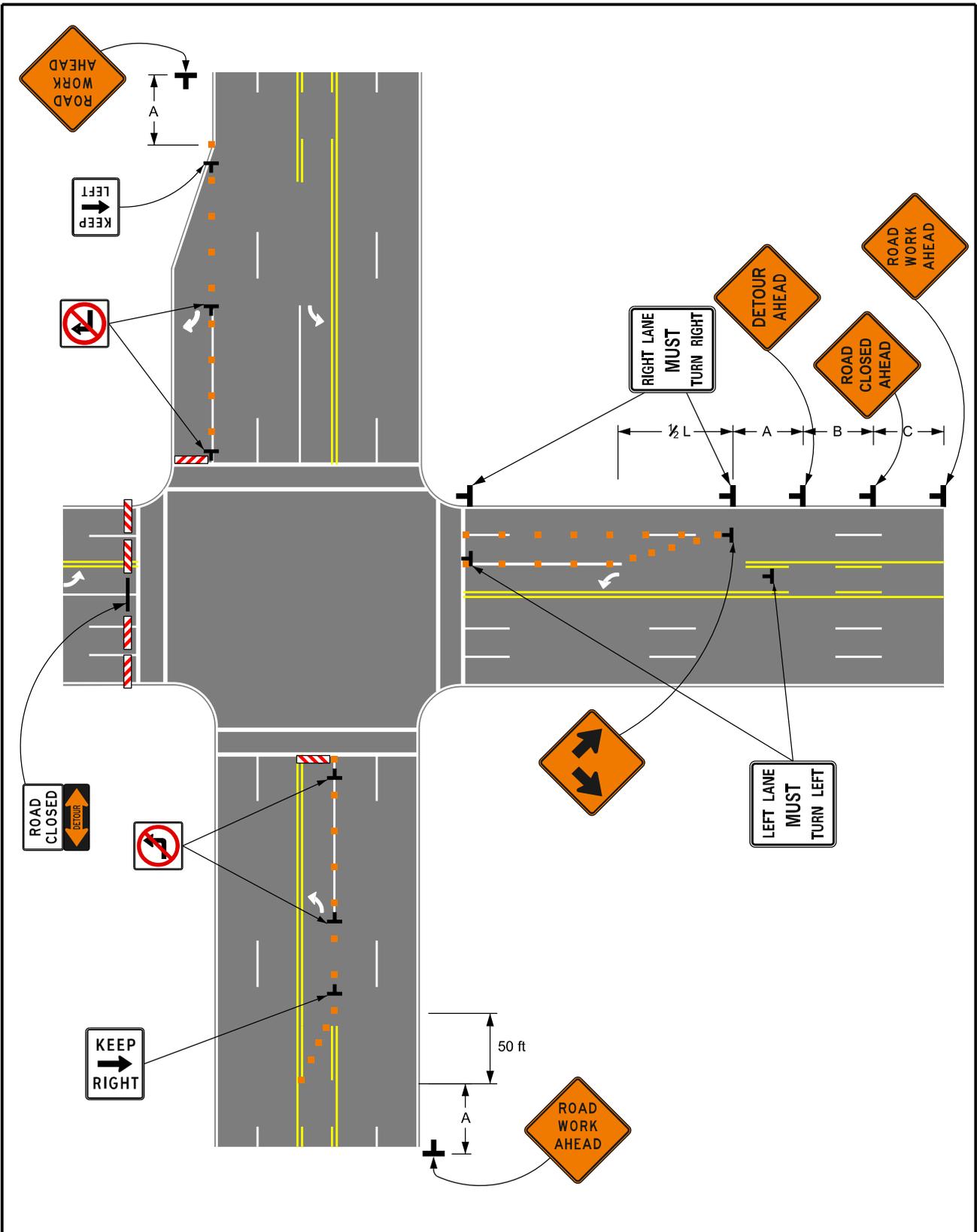
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-202b



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

Note: See TC-013 for Speed Reduction signage and locations.



Turn Lane Treatments for Hard Closure

Typical Application

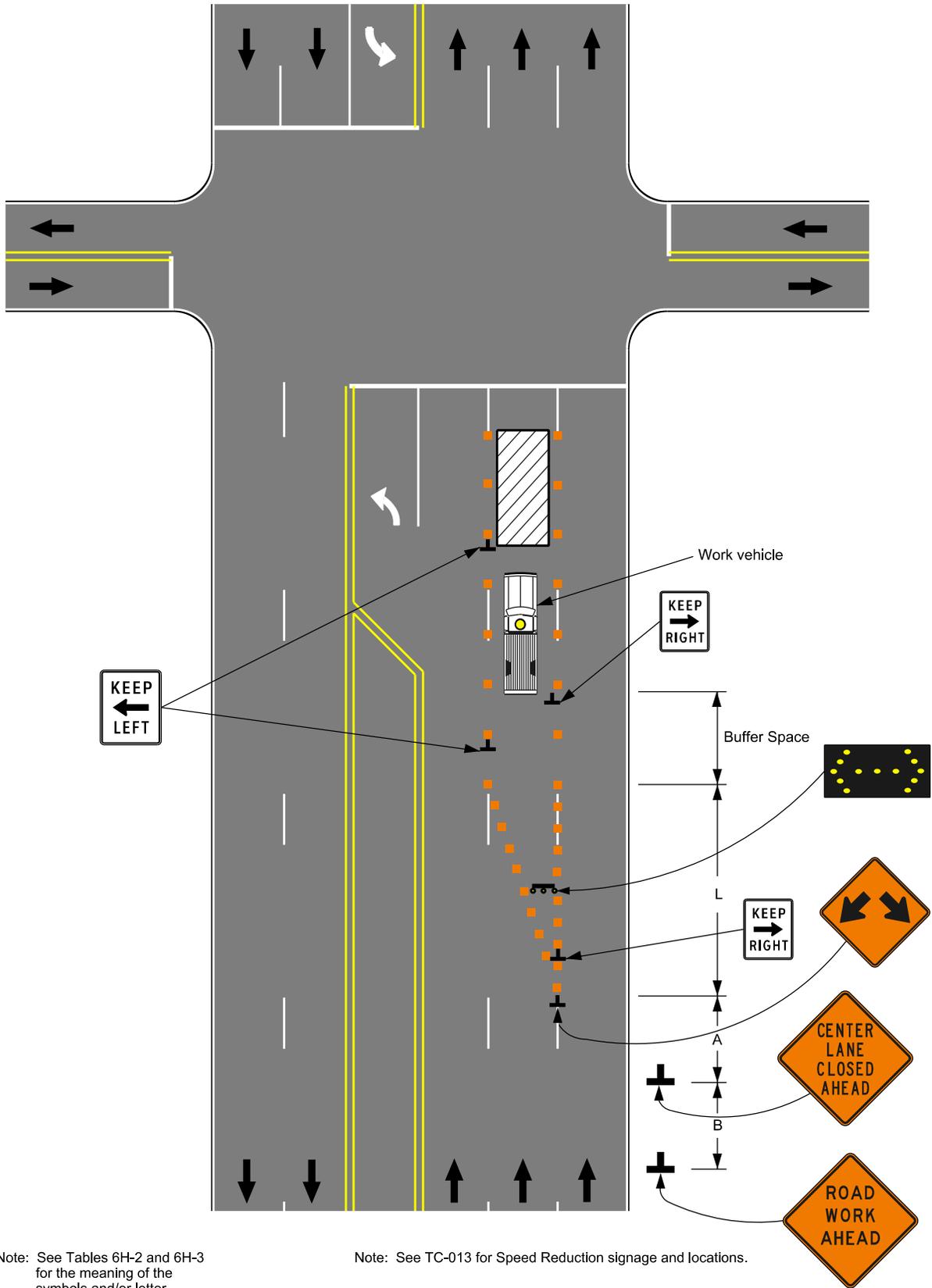
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-203



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

Note: See TC-013 for Speed Reduction signage and locations.



Lane Closure on Near Side of Intersection

Typical Application

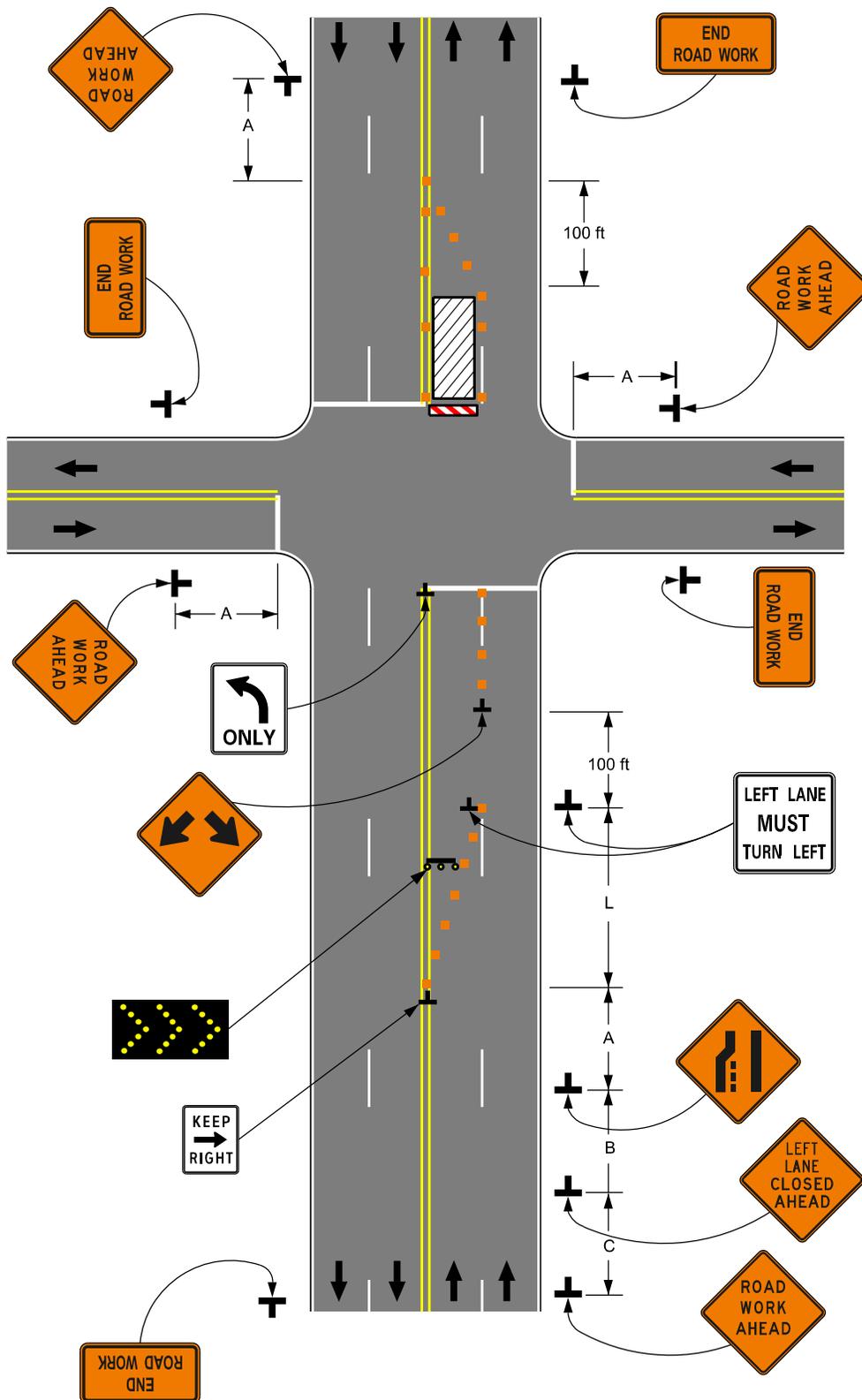
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-204



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

Note: See TC-013 for Speed Reduction signage and locations.



Left Lane Closure on Far Side of Intersection

Typical Application

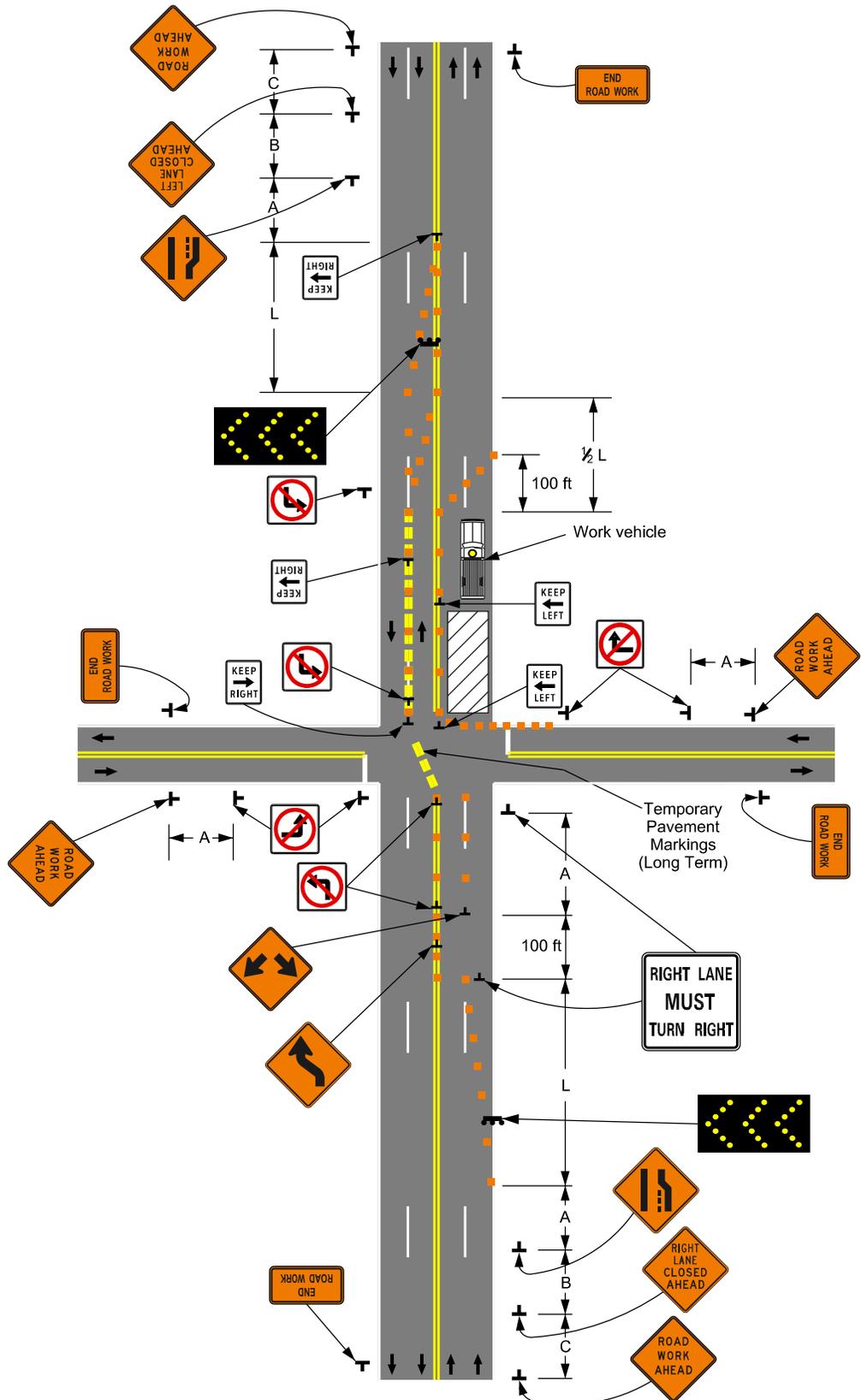
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-206



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

Note: See TC-013 for Speed Reduction signage and locations.



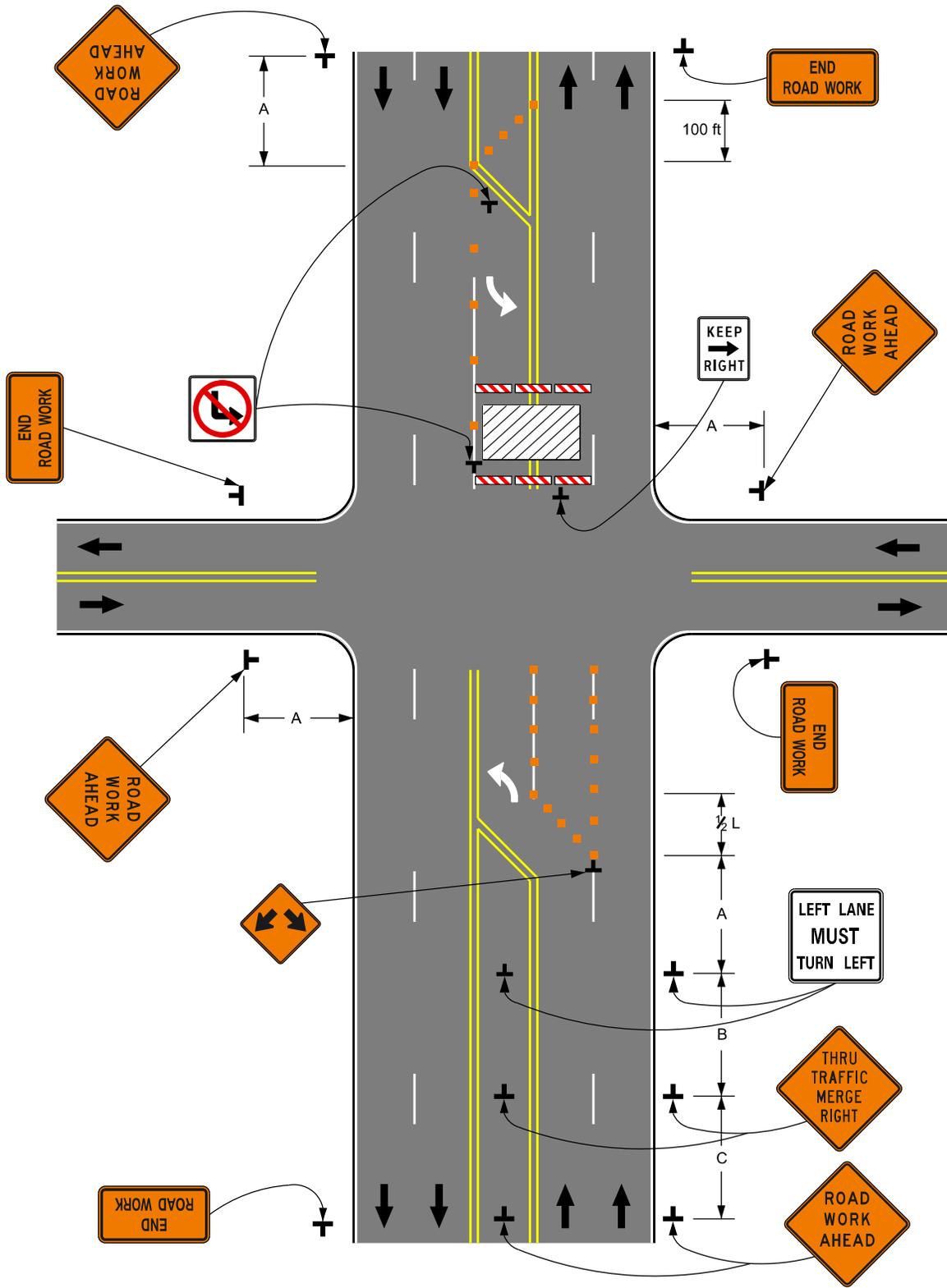
Half Road Closure on Far Side of Intersection

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-207



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

Note: See TC-013 for Speed Reduction signage and locations.



Multiple Lane Closures at Intersections

Typical Application

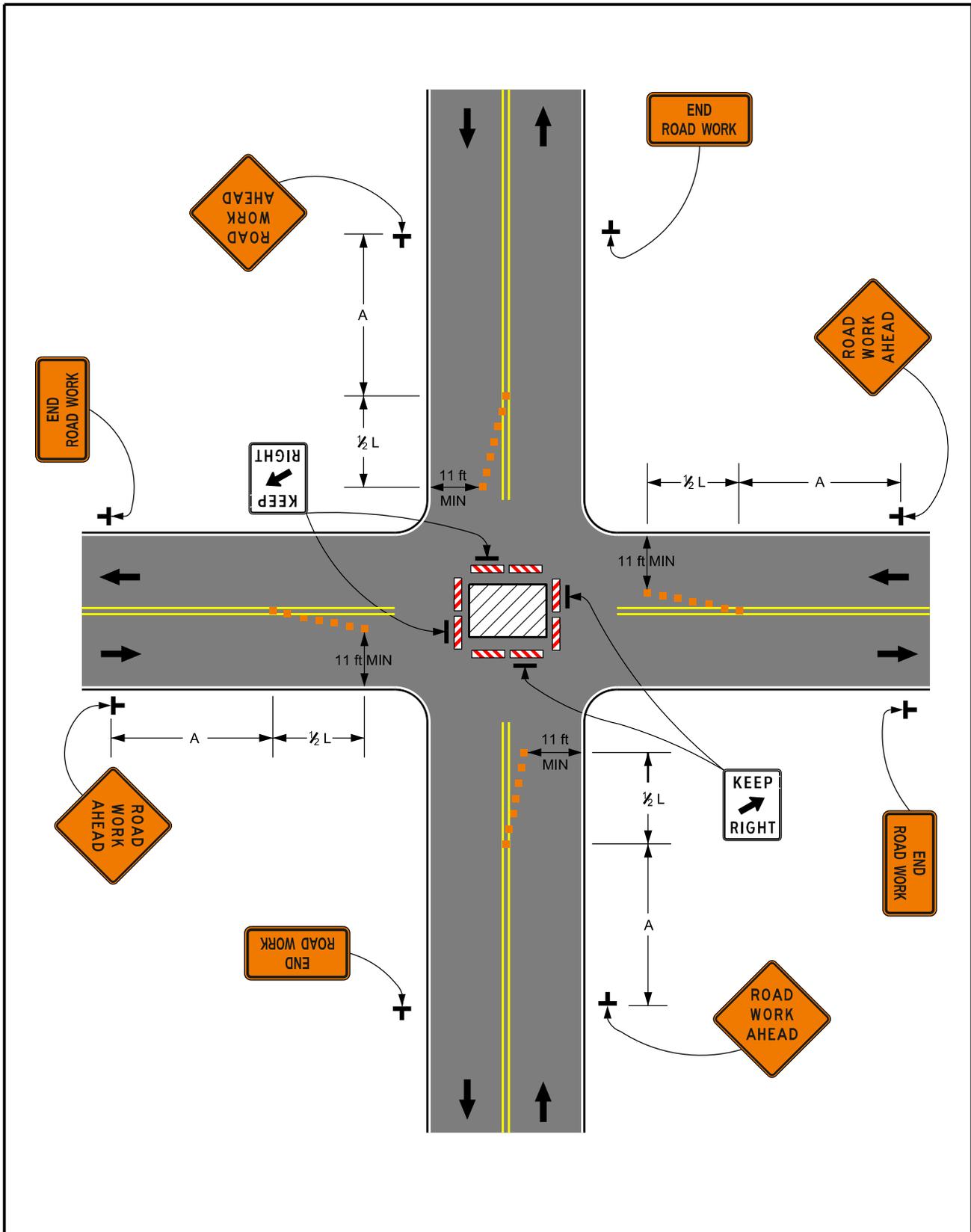
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-208



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

Note: See TC-013 for Speed Reduction signage and locations.



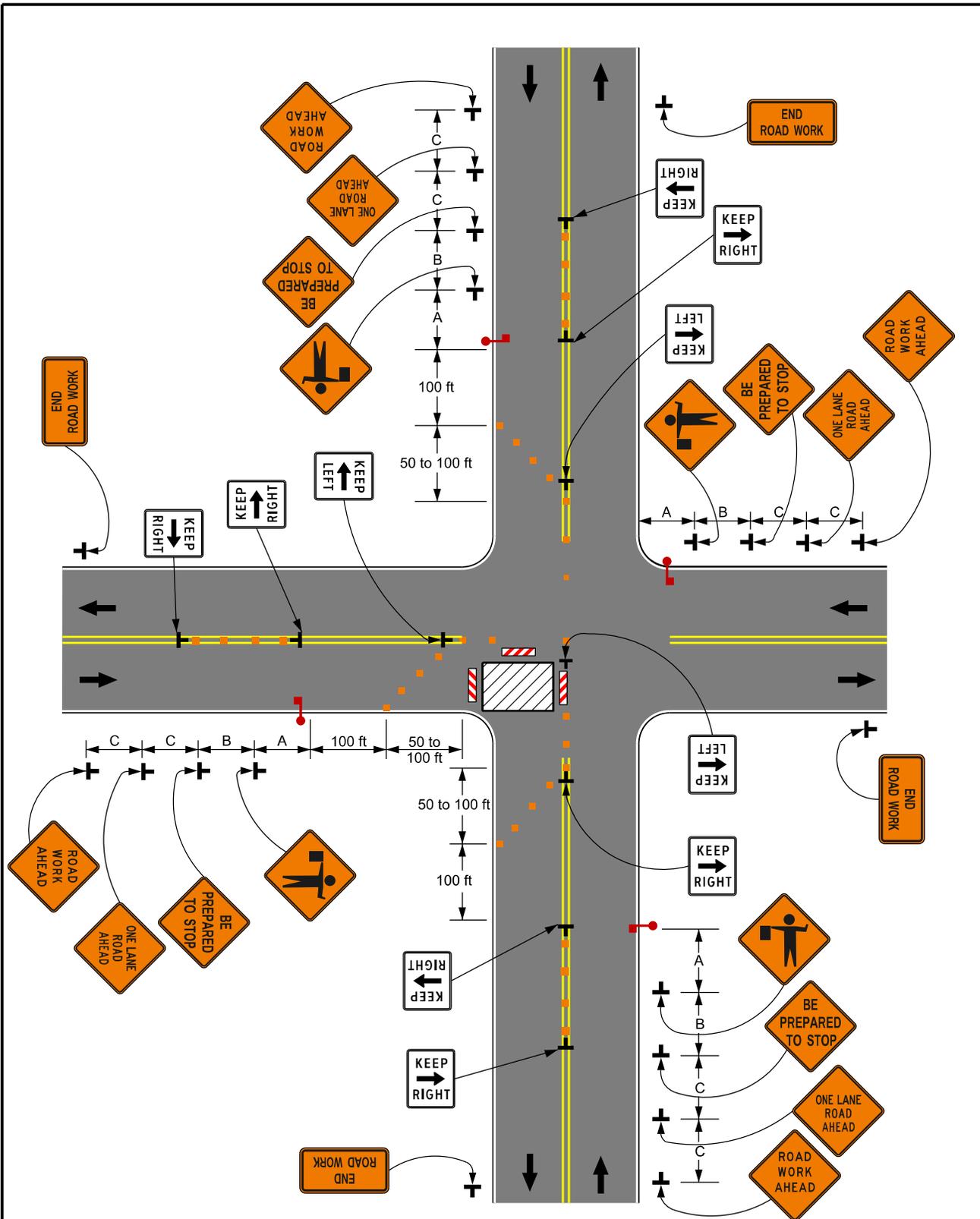
Closure in Center of Intersection

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-209



- Notes: 1. See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.
2. Depending on road conditions, flagger(s) or uniformed law enforcement officer(s) should be used to direct road users within the intersection.

Note: See TC-013 for Speed Reduction signage and locations.



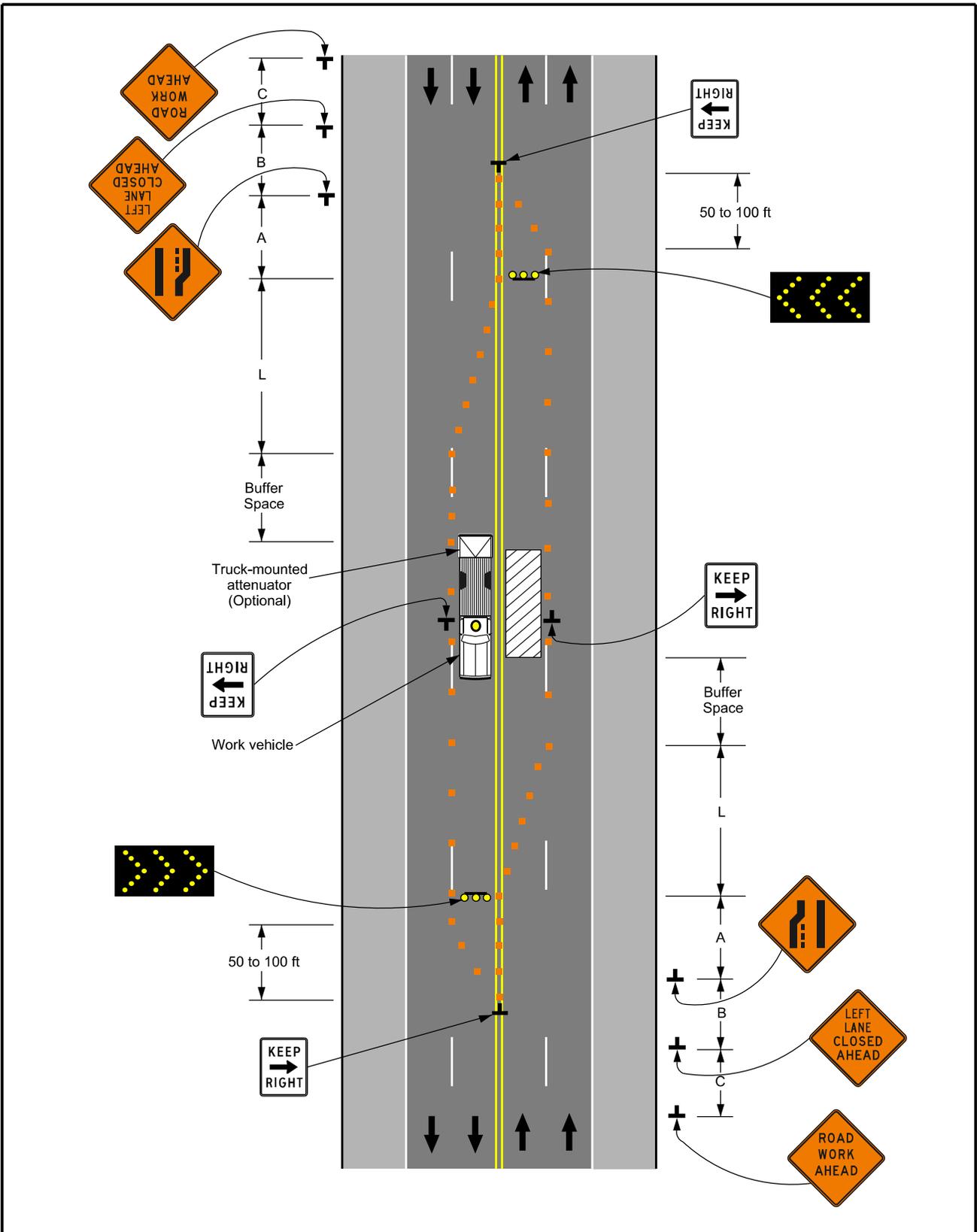
Closure at Side of Intersection

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-210



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

Note: See TC-013 for Speed Reduction signage and locations.



Interior Lane Closure on Multi-Lane Street

Typical Application

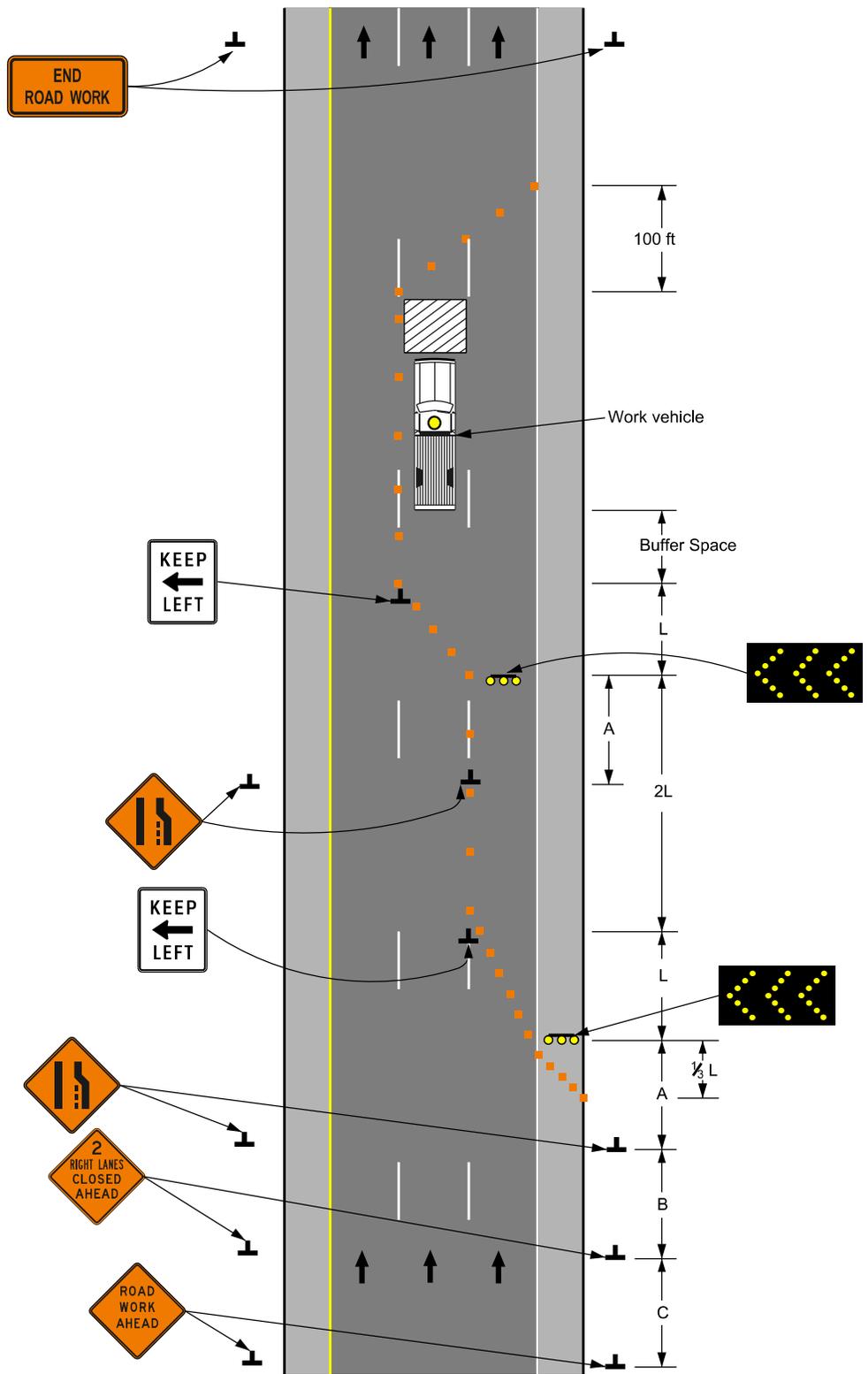
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-211



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

Note: See TC-013 for Speed Reduction signage and locations.



Double Lane Closure on Multi-Lane Road

Typical Application

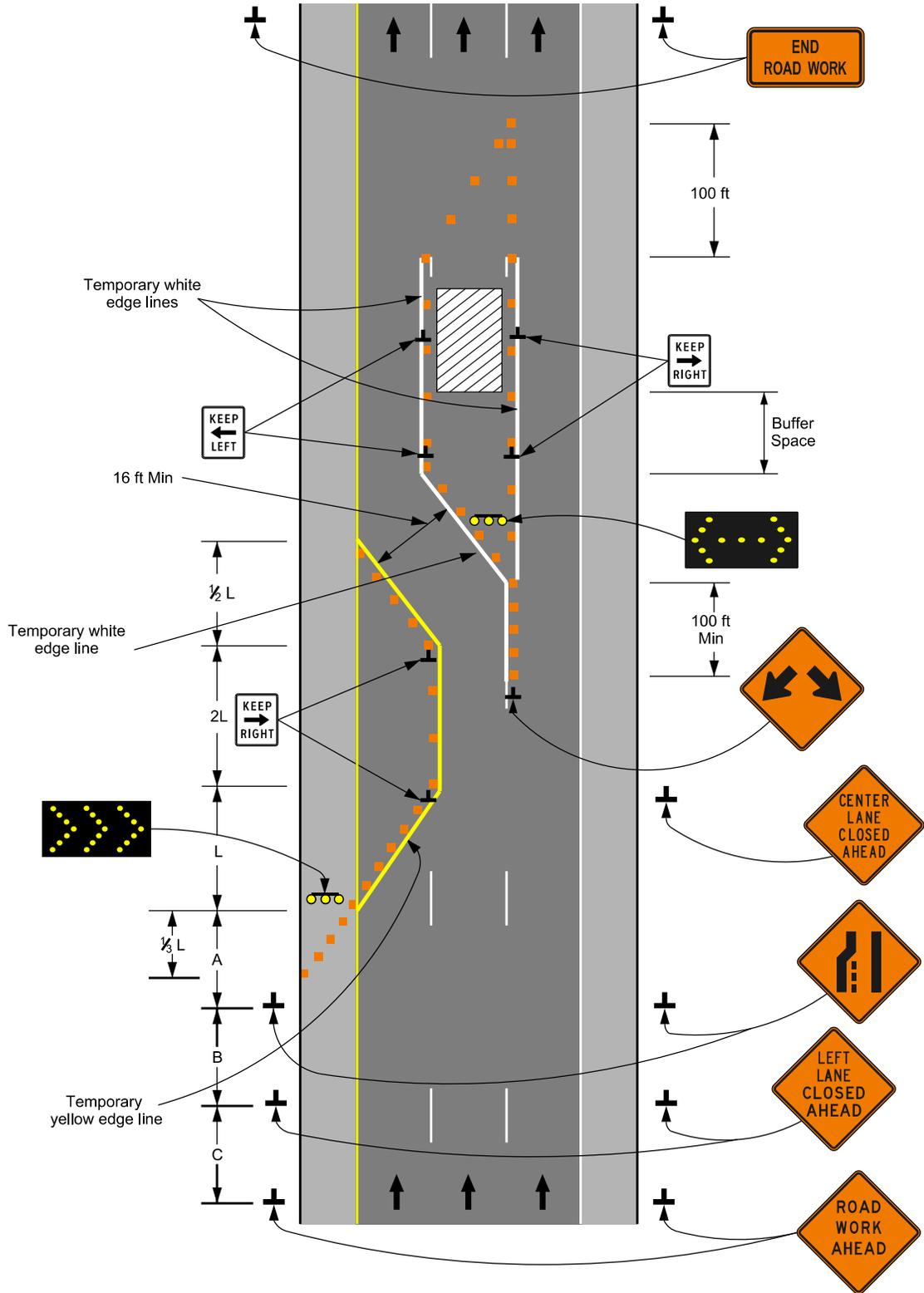
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-212



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

Note: See TC-013 for Speed Reduction signage and locations.



Interior Lane Closure on Multi-Lane Roadway

Typical Application

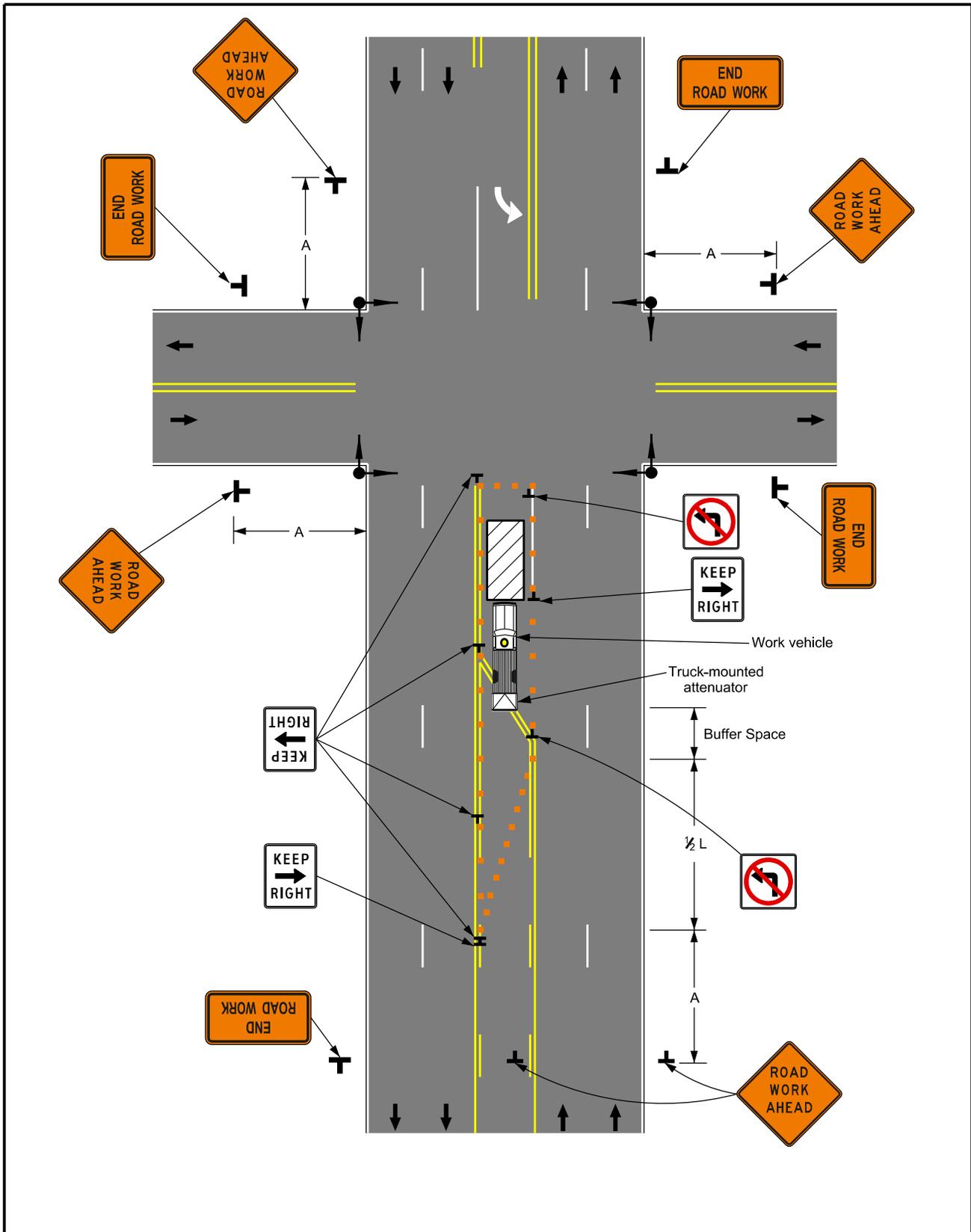
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-213



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

Note: See TC-013 for Speed Reduction signage and locations.



Turn Lane Closure at a Signalized Intersection

Typical Application

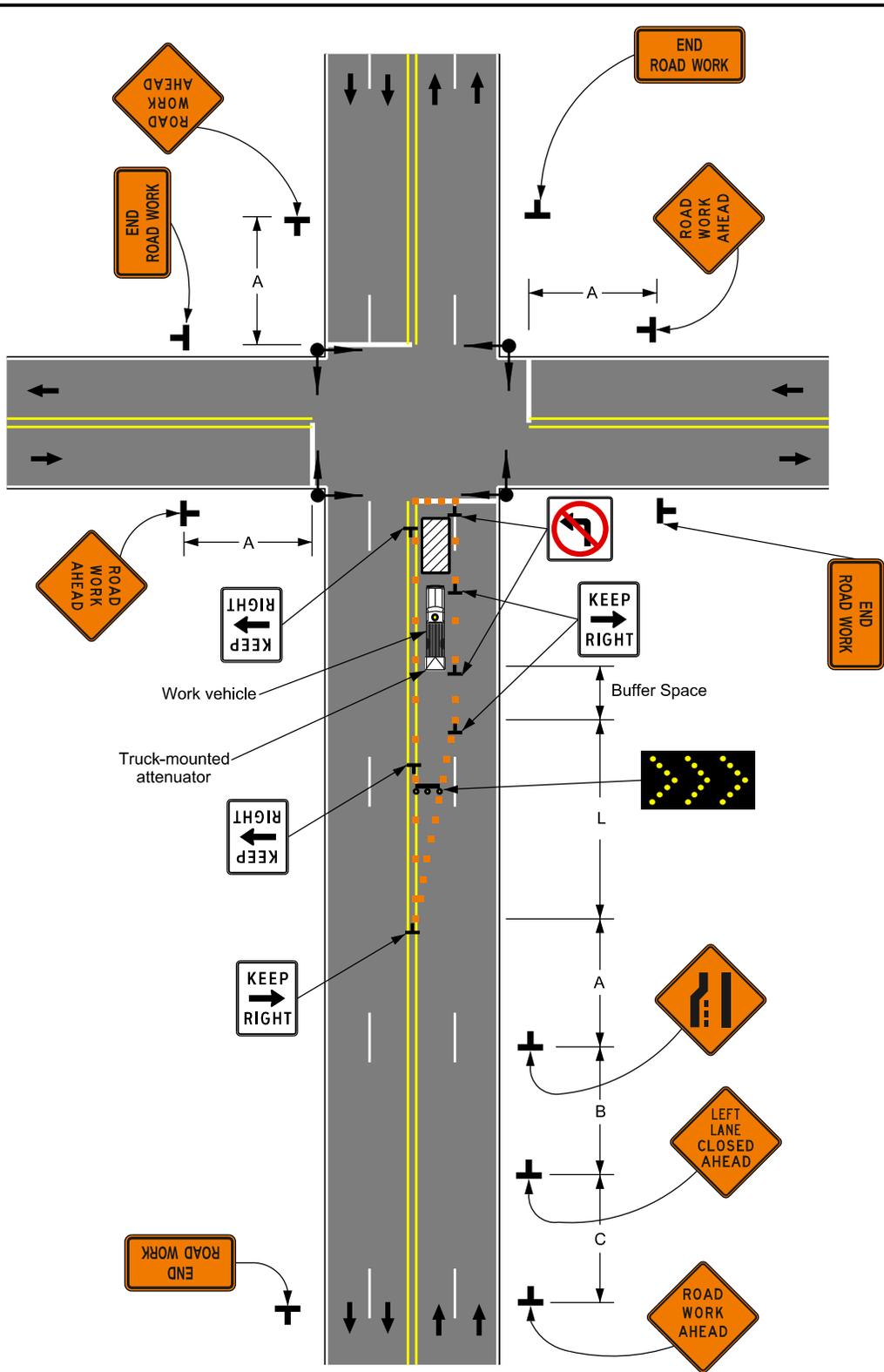
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-214



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

Note: See TC-013 for Speed Reduction signage and locations.

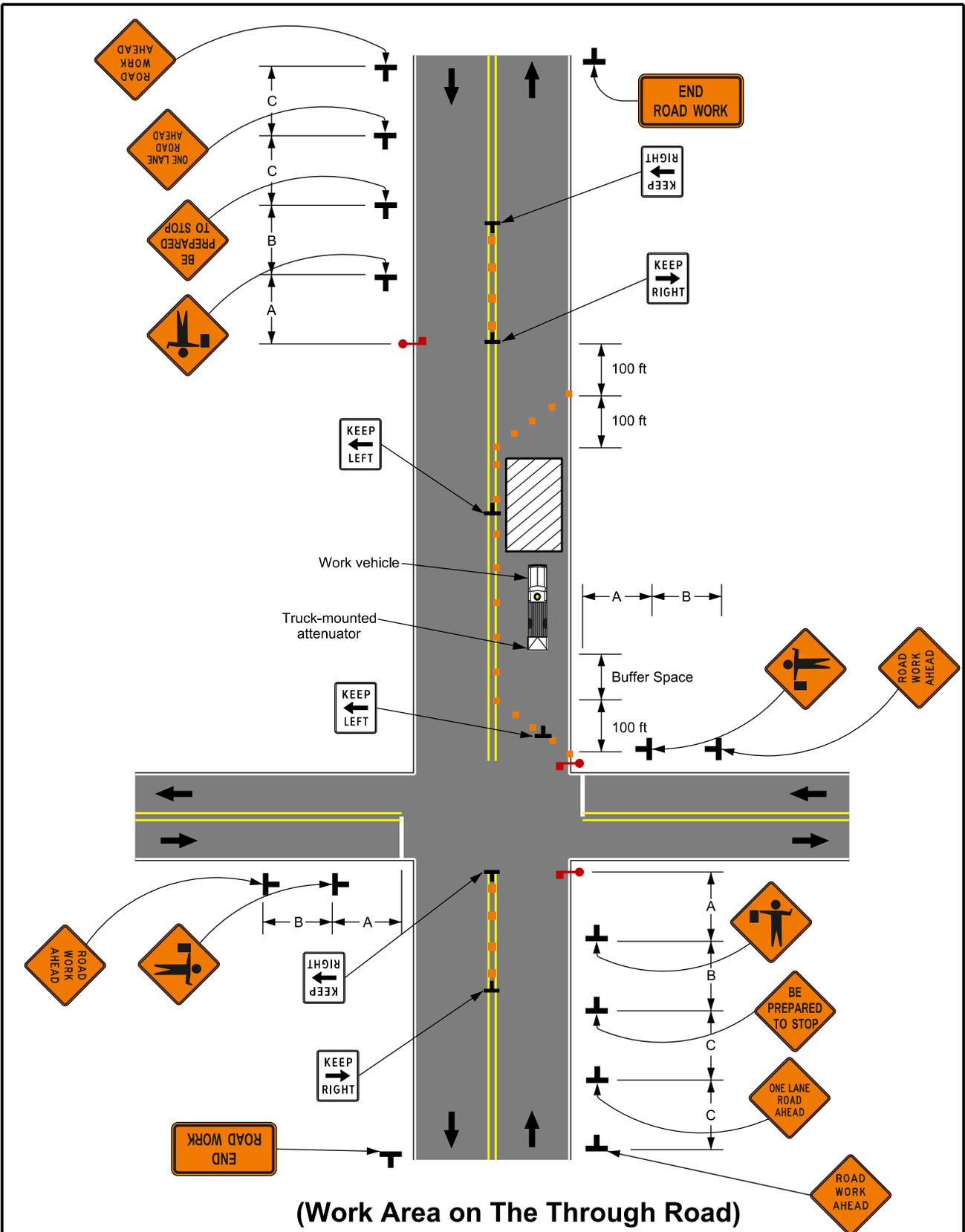


Lane Closure at a Signalized Intersection 4 Lane 2 Way Traffic Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-215



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

Note: See TC-013 for Speed Reduction signage and locations.



Right Lane Closure on Far Side of Intersection

Typical Application

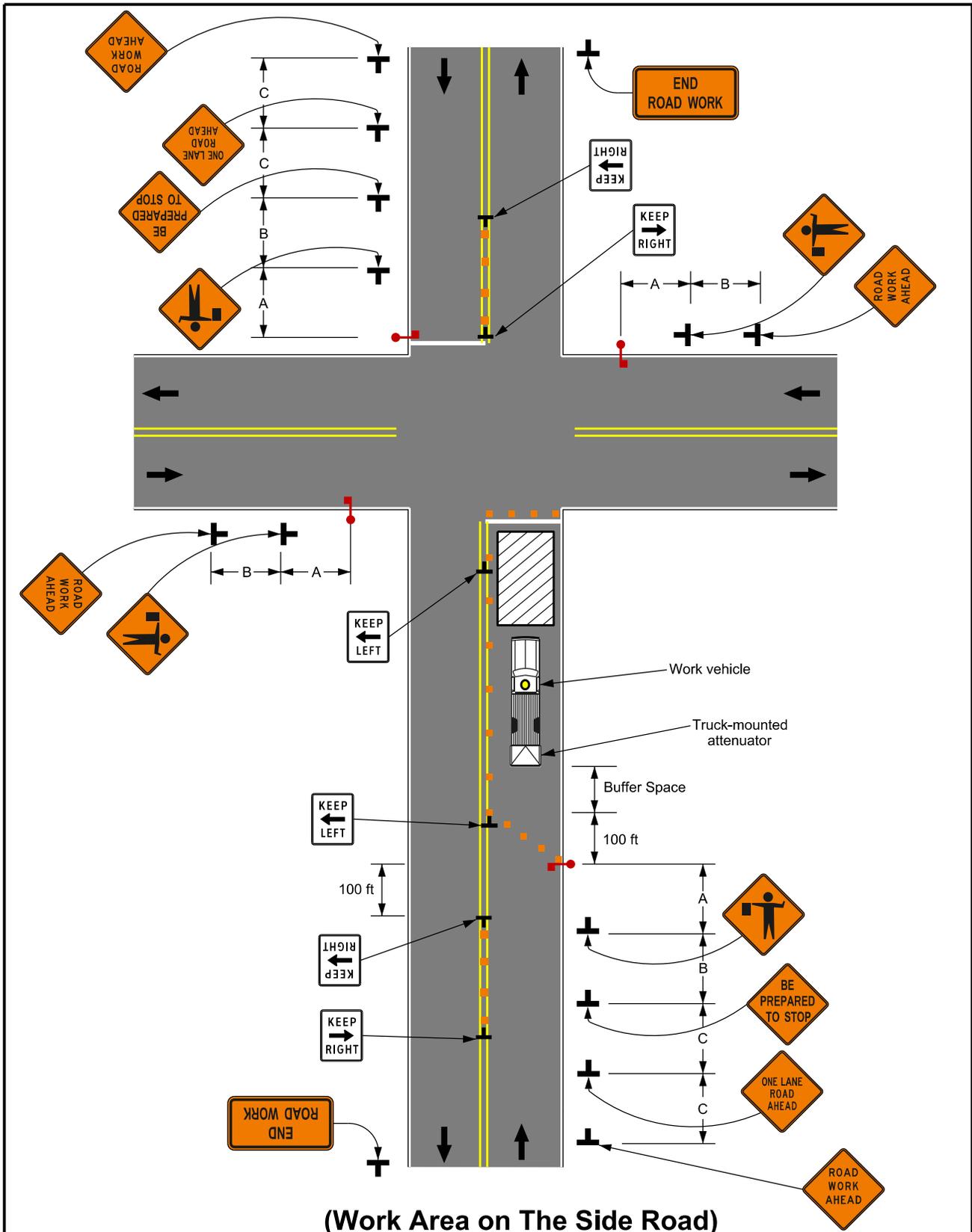
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-217



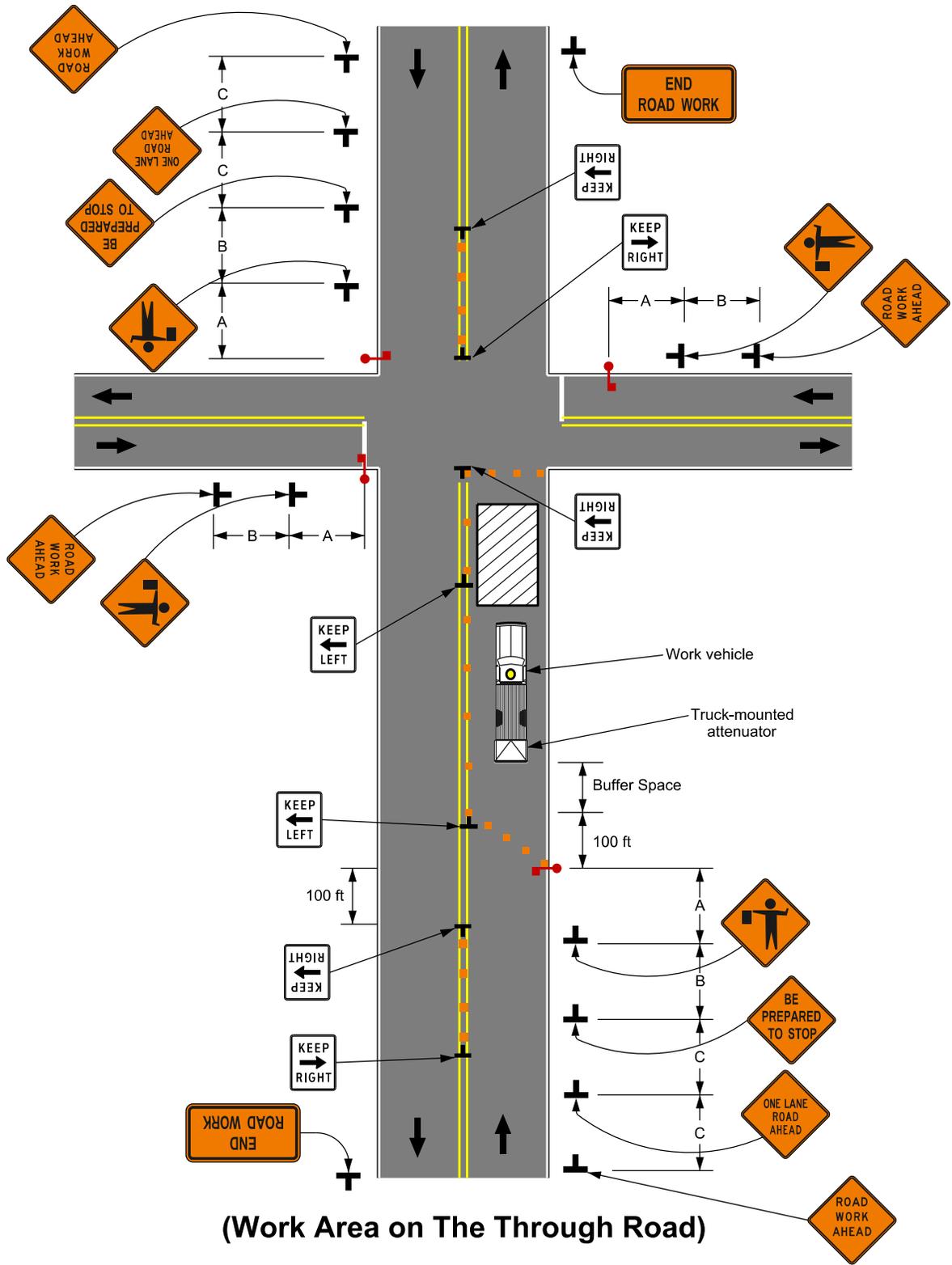
Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Note: See TC-013 for Speed Reduction signage and locations.



**Right Lane Closure on
Near Side of Intersection
(Side Road)
Typical Application**

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION TRAFFIC MANAGEMENT DIVISION	
DATE 9/15	PAGE TC-218



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

Note: See TC-013 for Speed Reduction signage and locations.

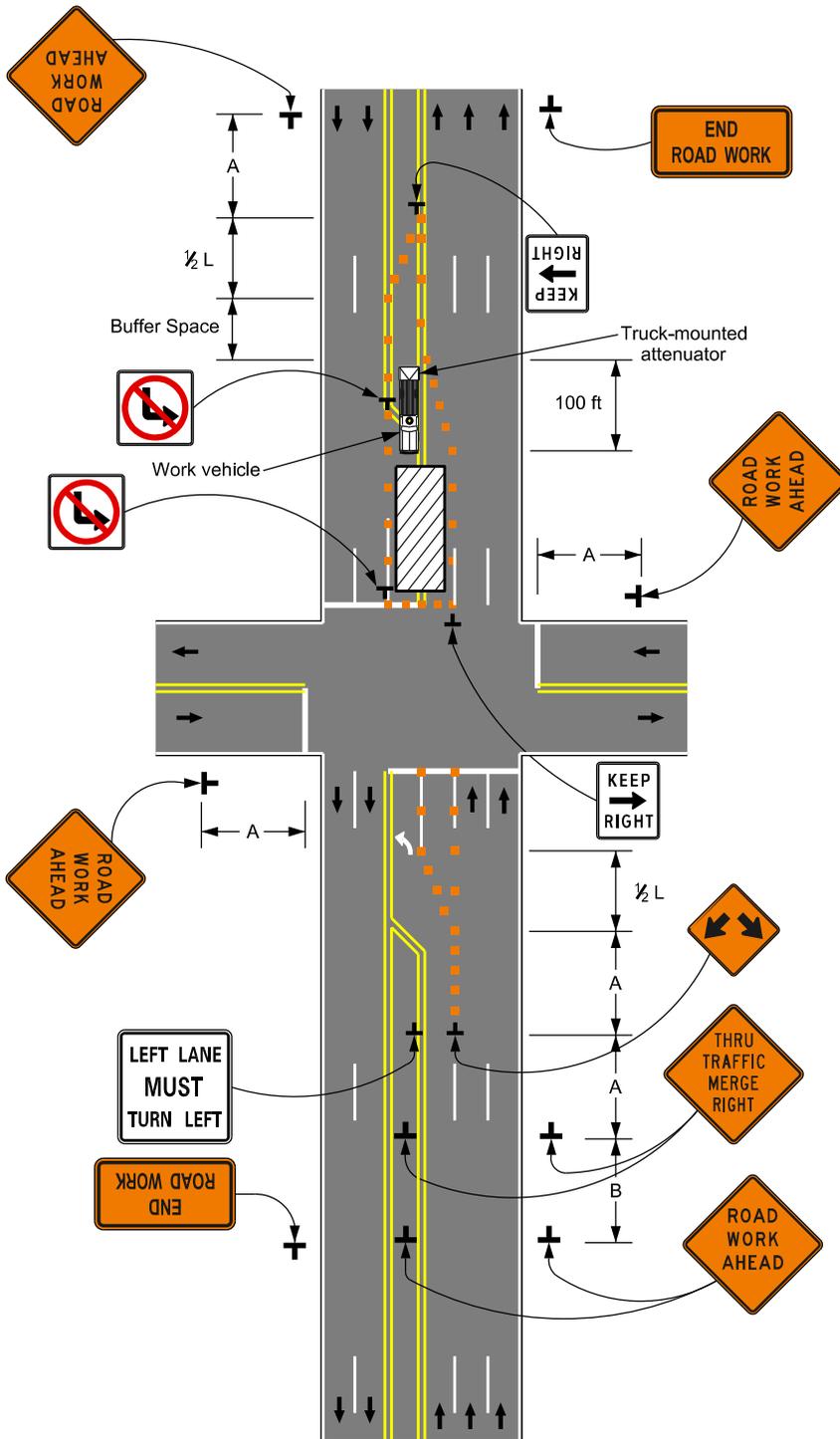


Right Lane Closure on Near Side of Intersection (Thru Road) Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-219



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

Note: See TC-013 for Speed Reduction signage and locations.



Multiple Lane Closure at Intersection

Typical Application

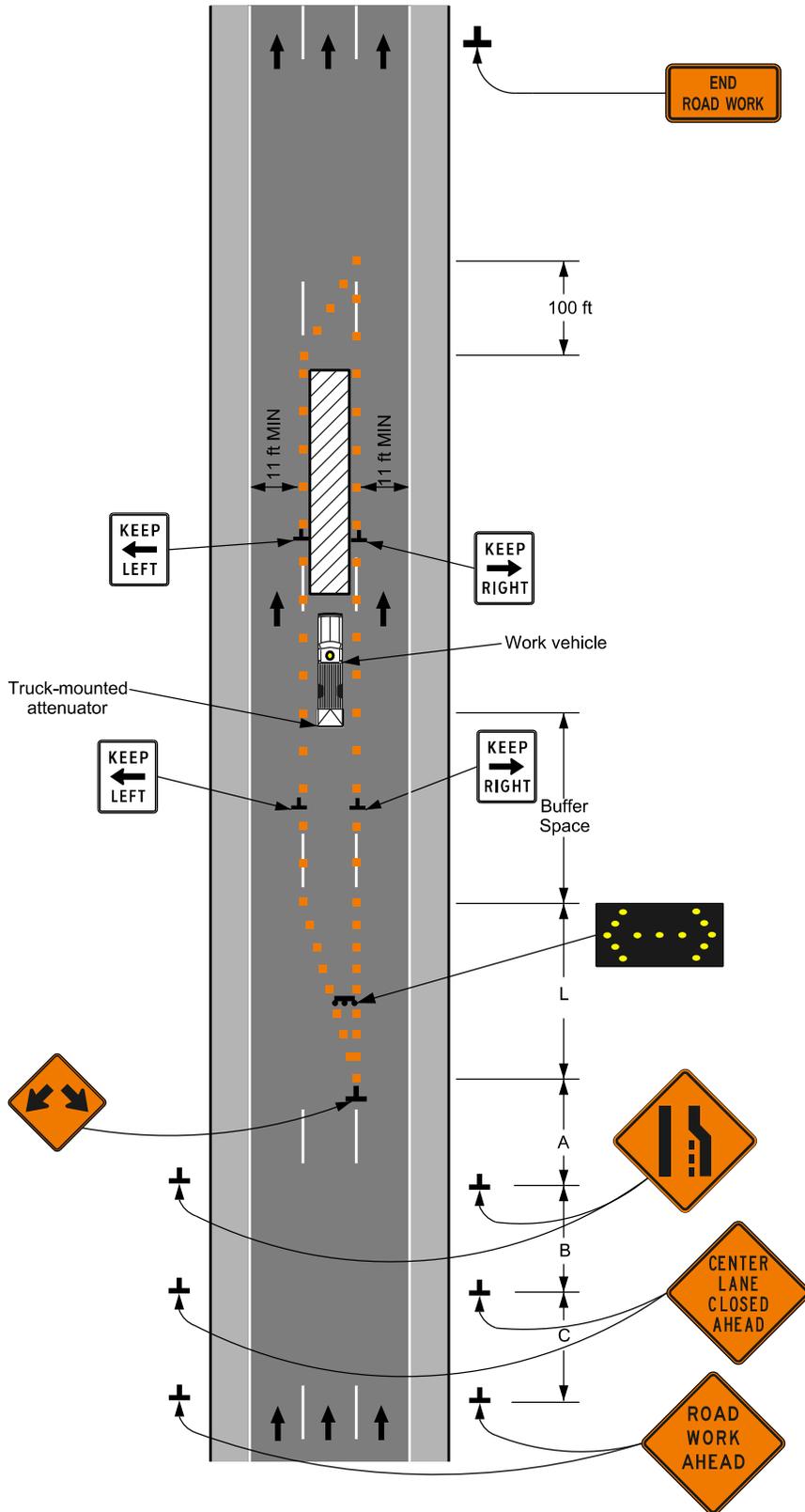
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-220



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

Note: See TC-013 for Speed Reduction signage and locations.



Center Lane Closure on Multi-Lane Road

Typical Application

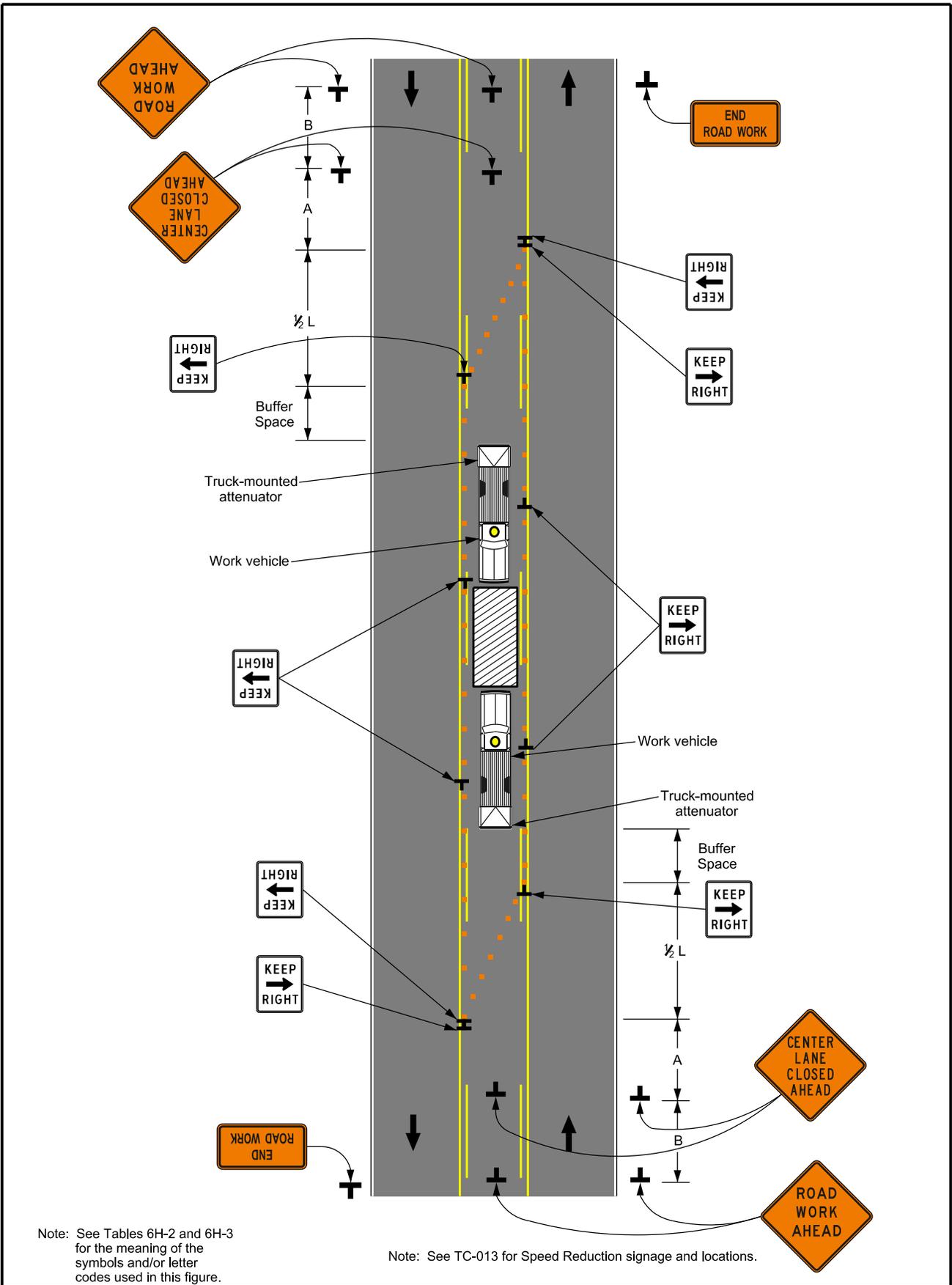
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-221



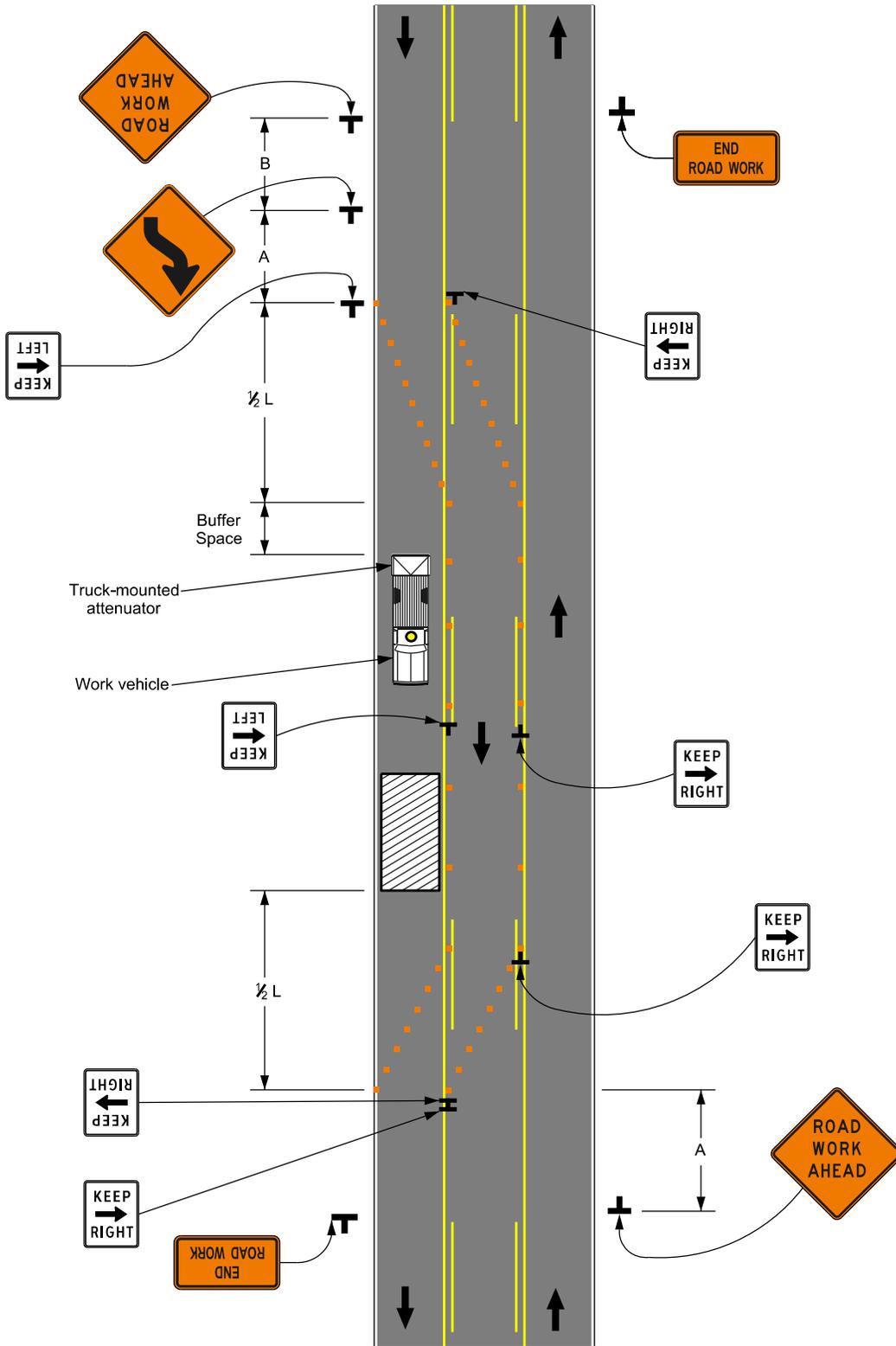
Center Turn Lane Closure

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-222



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

Note: See TC-013 for Speed Reduction signage and locations.



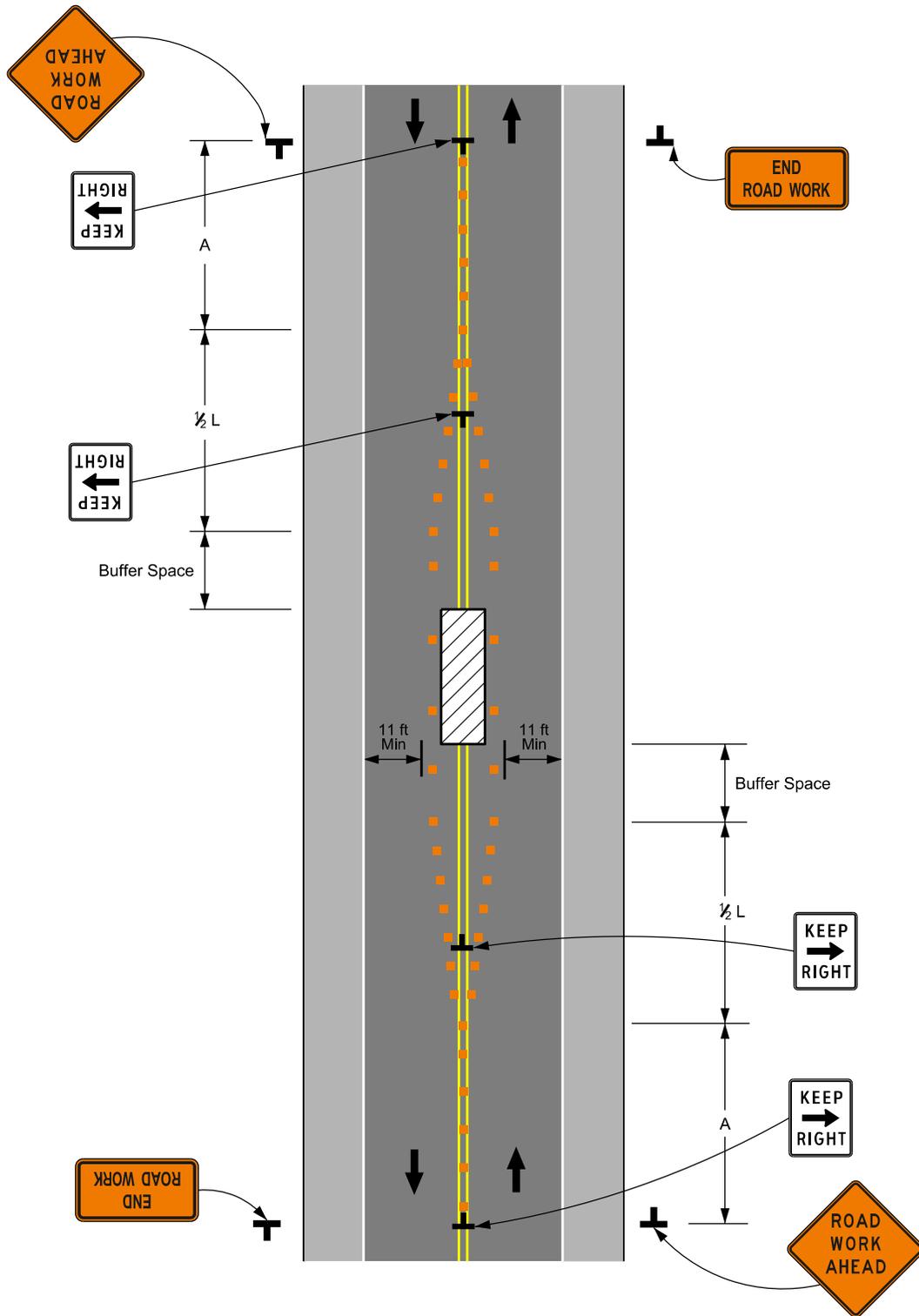
Lane Shift on Three-Lane, Two-Way Road

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-223



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



Work in Center of Road with Low Traffic Volumes

Typical Application

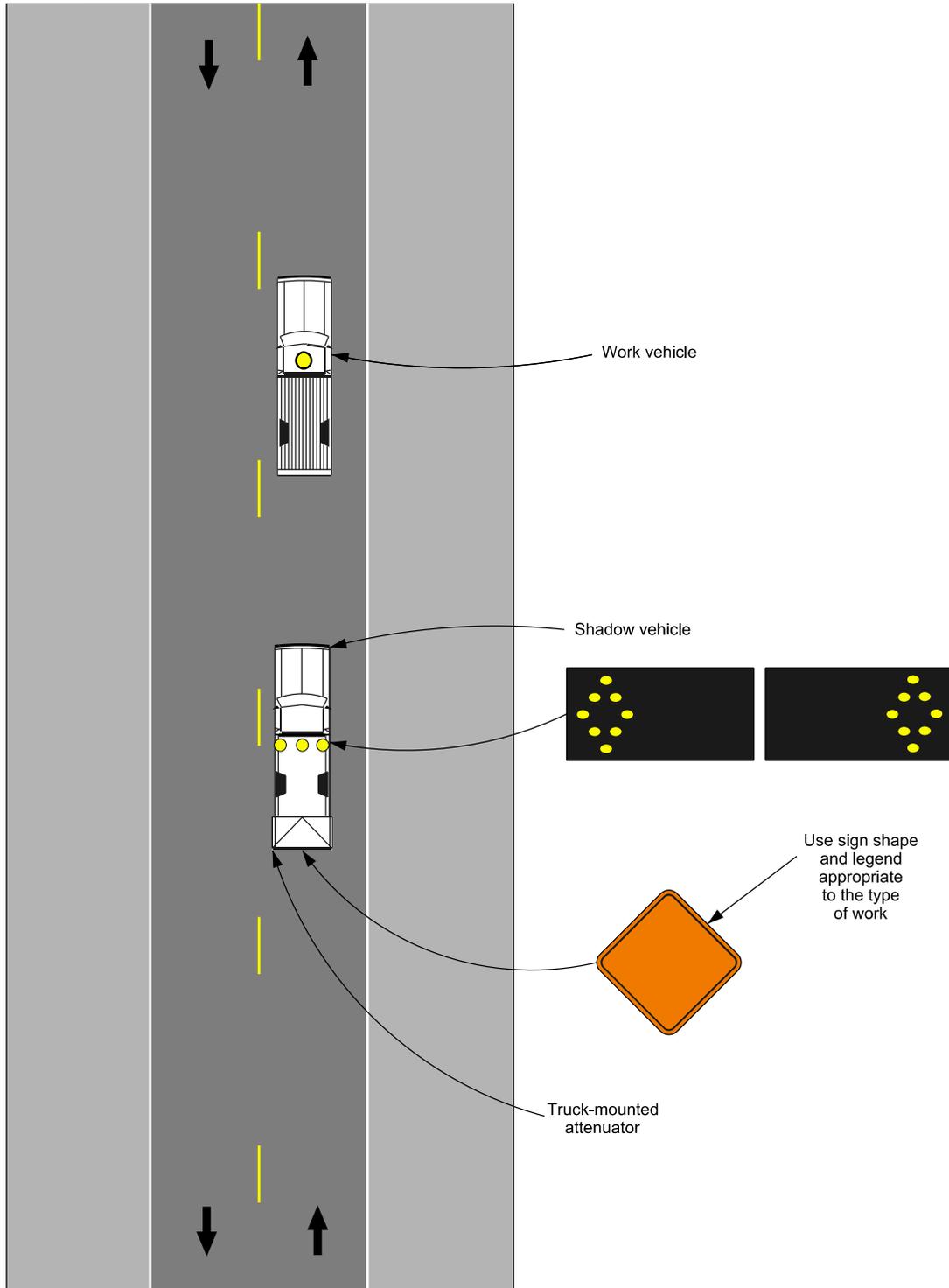
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-224



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



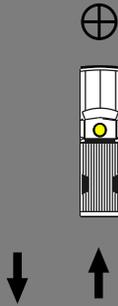
Mobile Operations on Two-Lane Road

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-225



Work vehicle



SHORT-DURATION
RESIDENTIAL (25MPH)

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



Surveying Residential Street

Typical Application

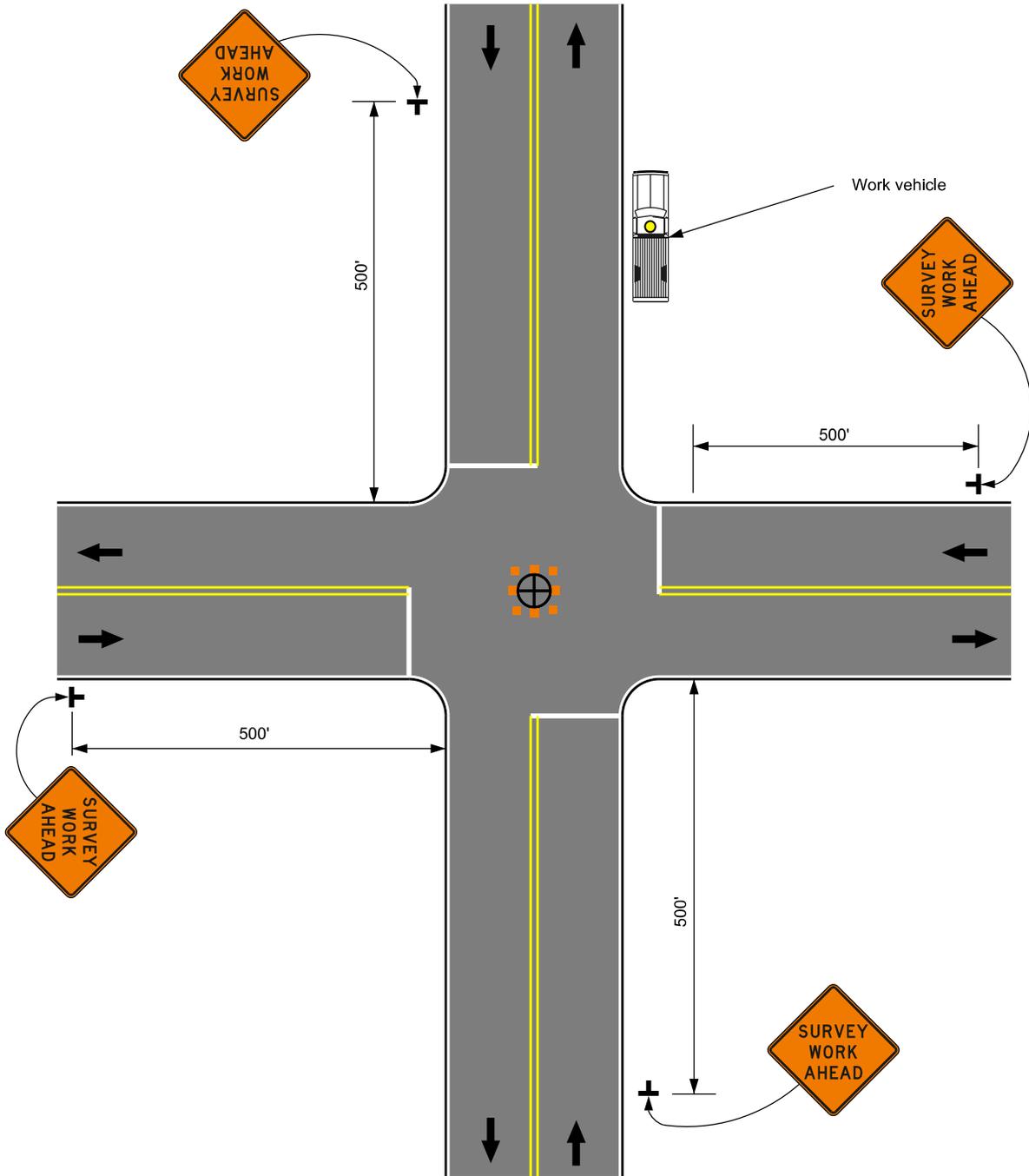
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-300



SHORT-DURATION

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

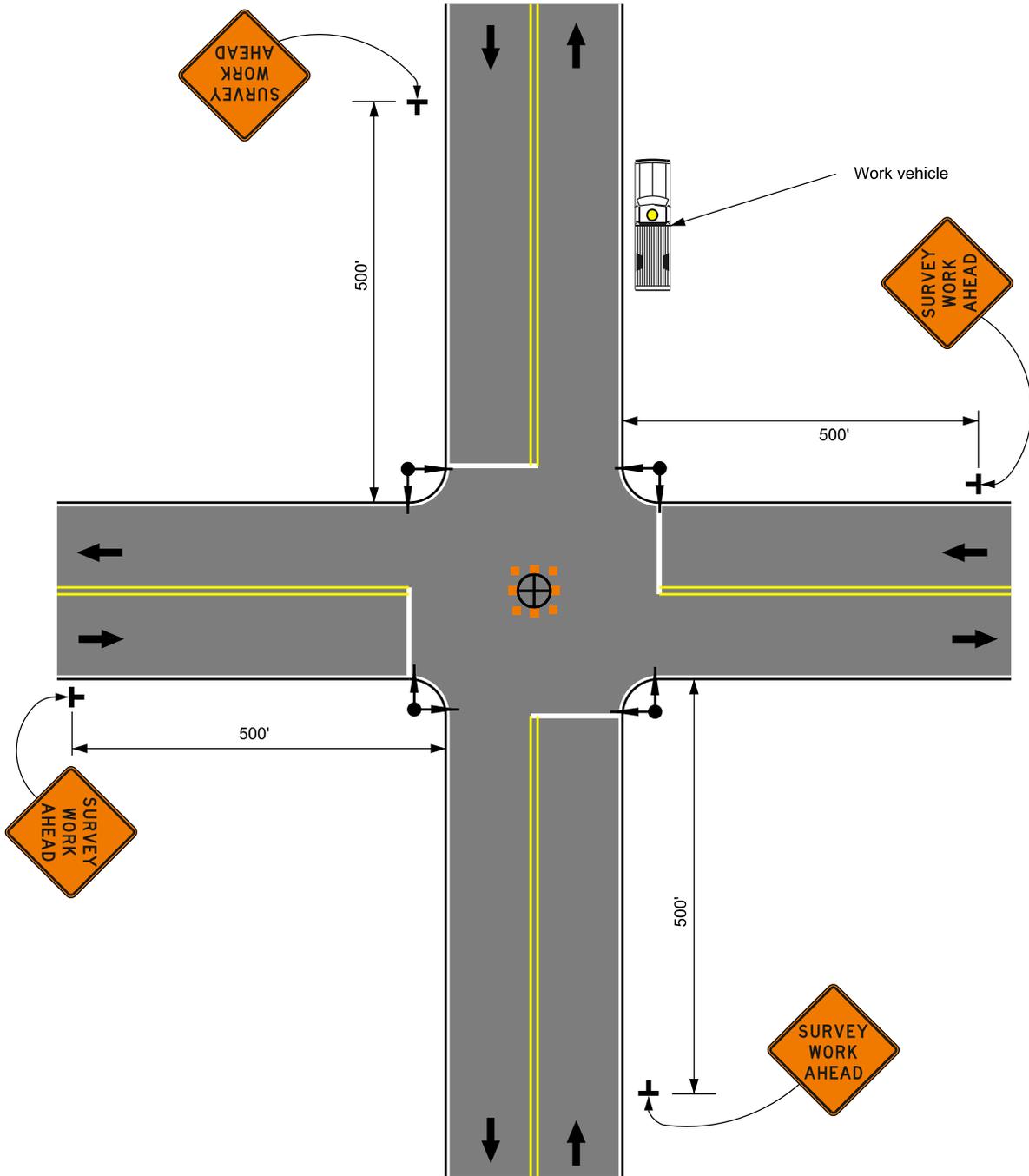


**Surveying
Closure in Center
of Intersection w/ 4-Way Stop
Typical Application**

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-301



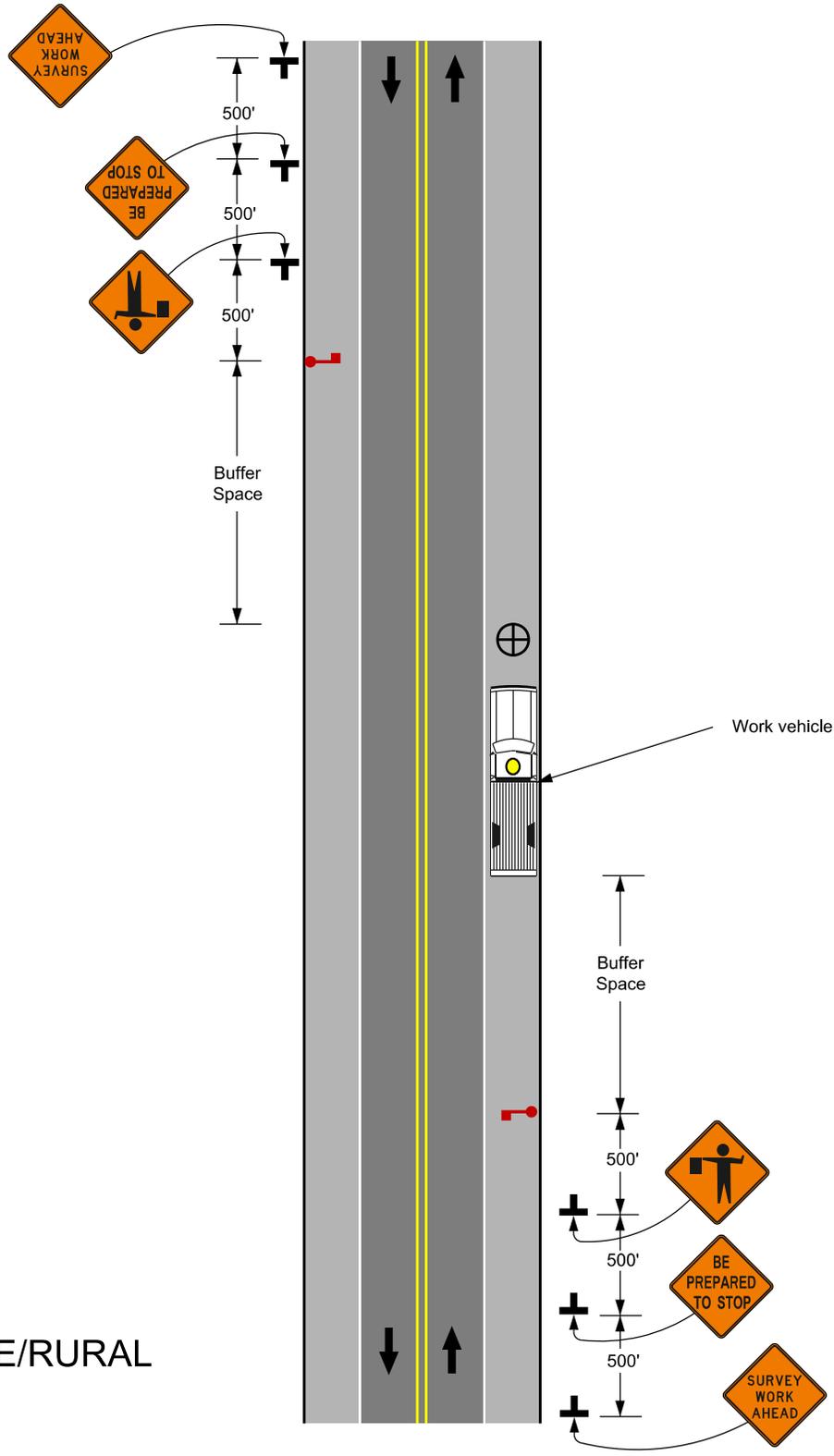
**SHORT-DURATION
35 MPH OR LESS**

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



**Surveying
Closure in Center
of Intersection w/ Signal
Typical Application**

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION TRAFFIC MANAGEMENT DIVISION	
DATE 9/15	PAGE TC-302



LOW VOLUME/RURAL

SHORT DURATION
RURAL

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



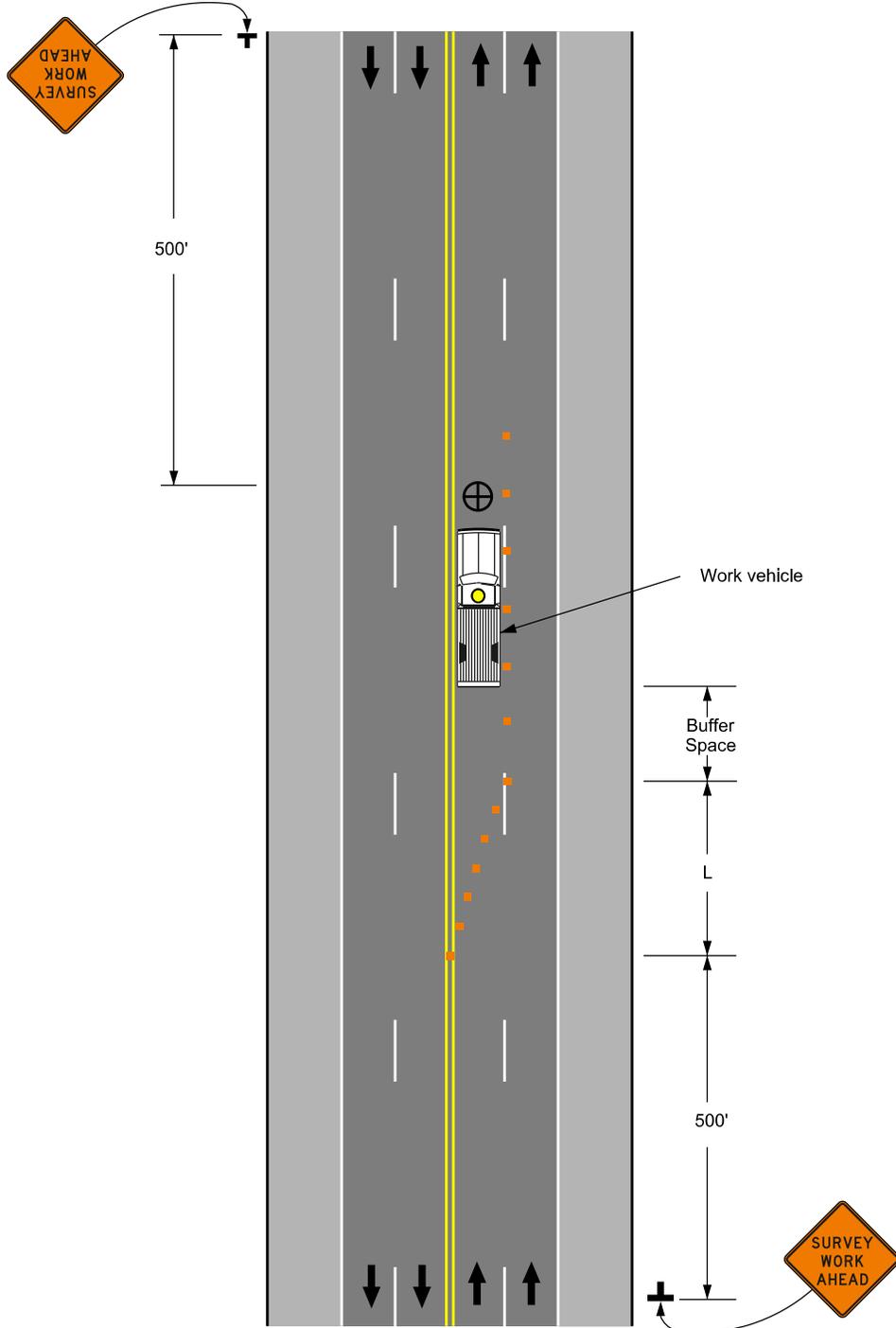
**Surveying
Temporary Road Closure**

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-303



LOW VOLUME/RURAL

SHORT-DURATION

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

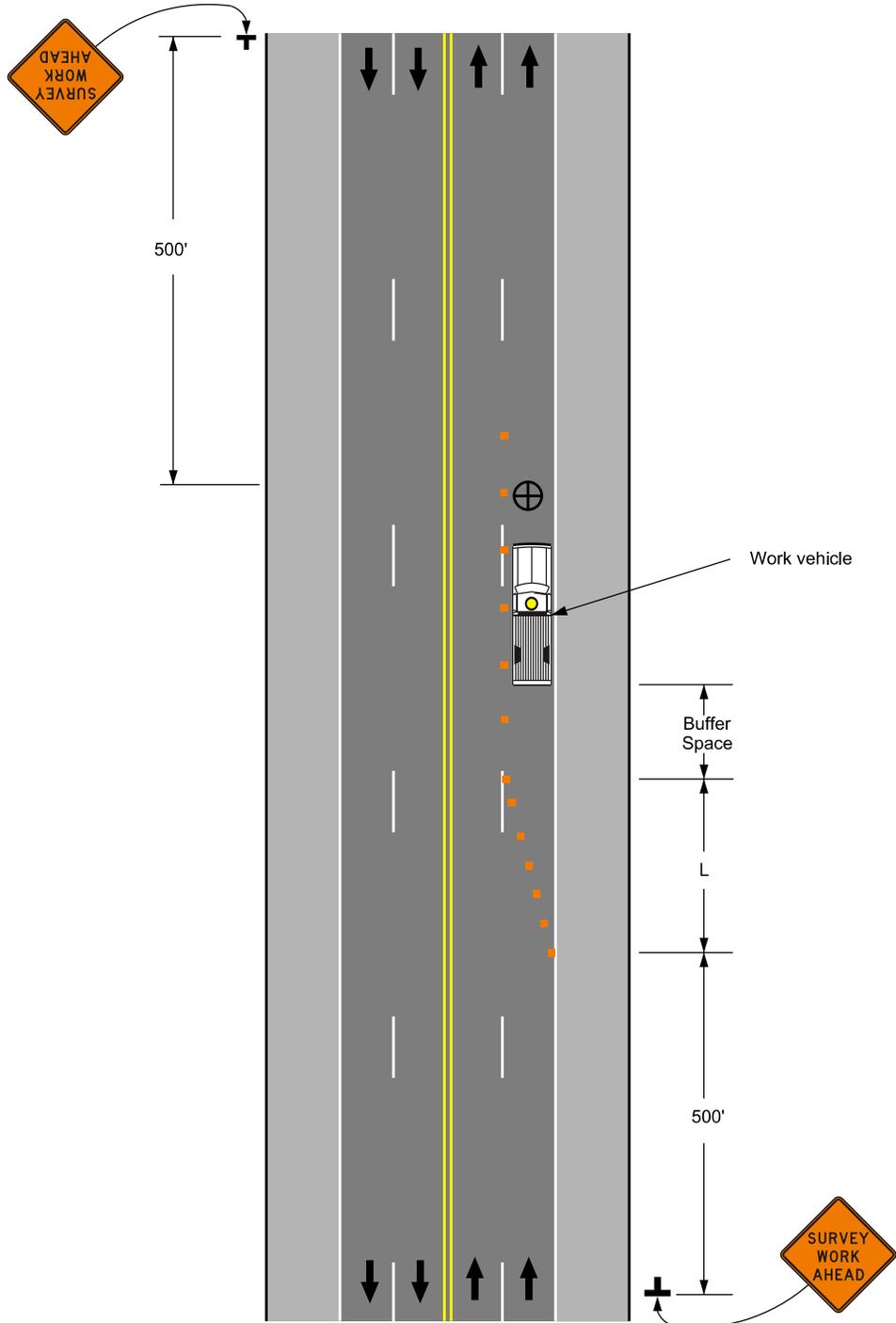


Surveying Left Lane Closure on Multi-Lane Street Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-304



LOW VOLUME/RURAL

SHORT-DURATION

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

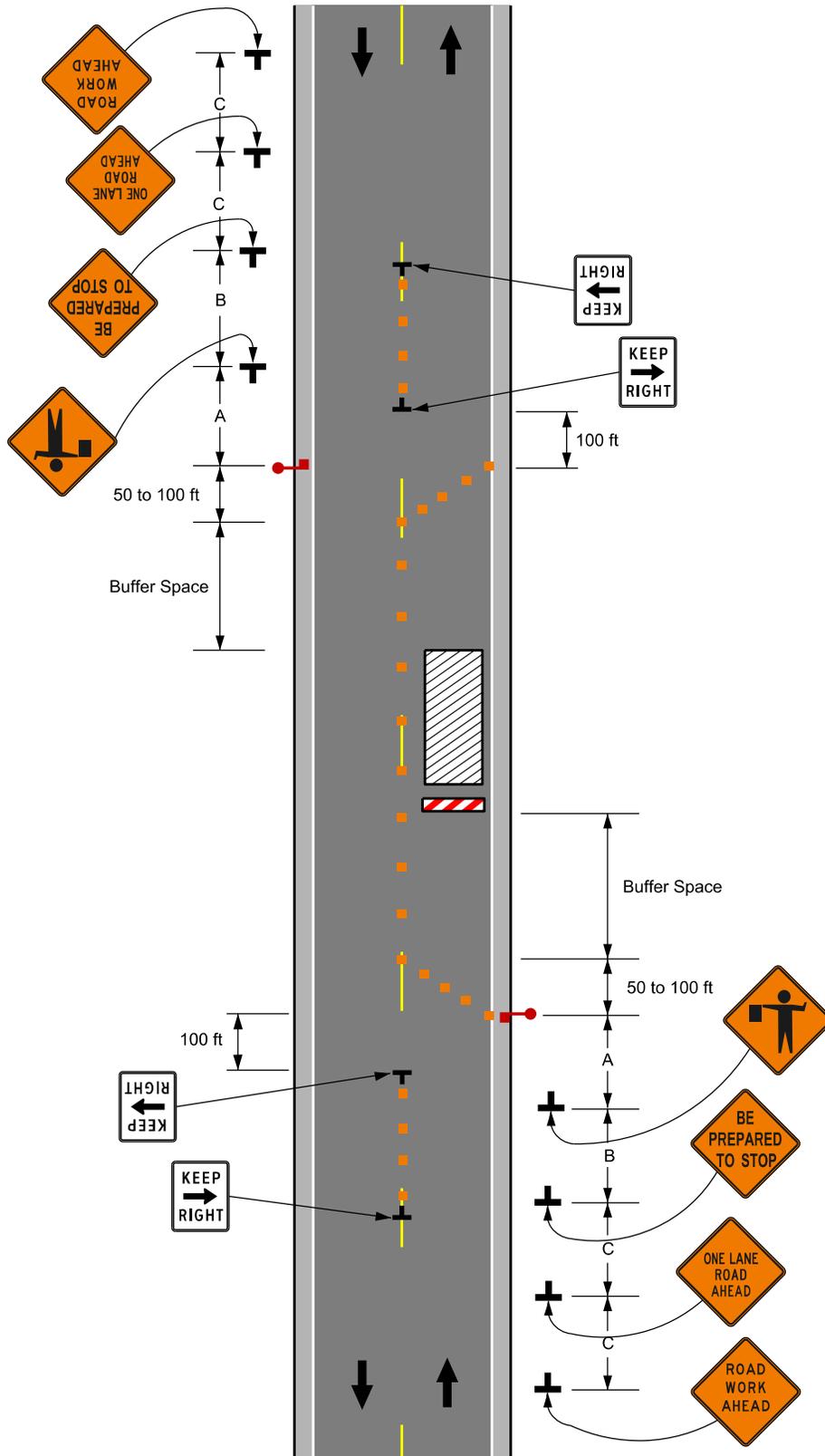


**Surveying
Right Lane Closure on
Multi-Lane Street
Typical Application**

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-305



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



Lane Closure on Two-Lane Road Using Flaggers (Speed Less than 40mph) Typical Application

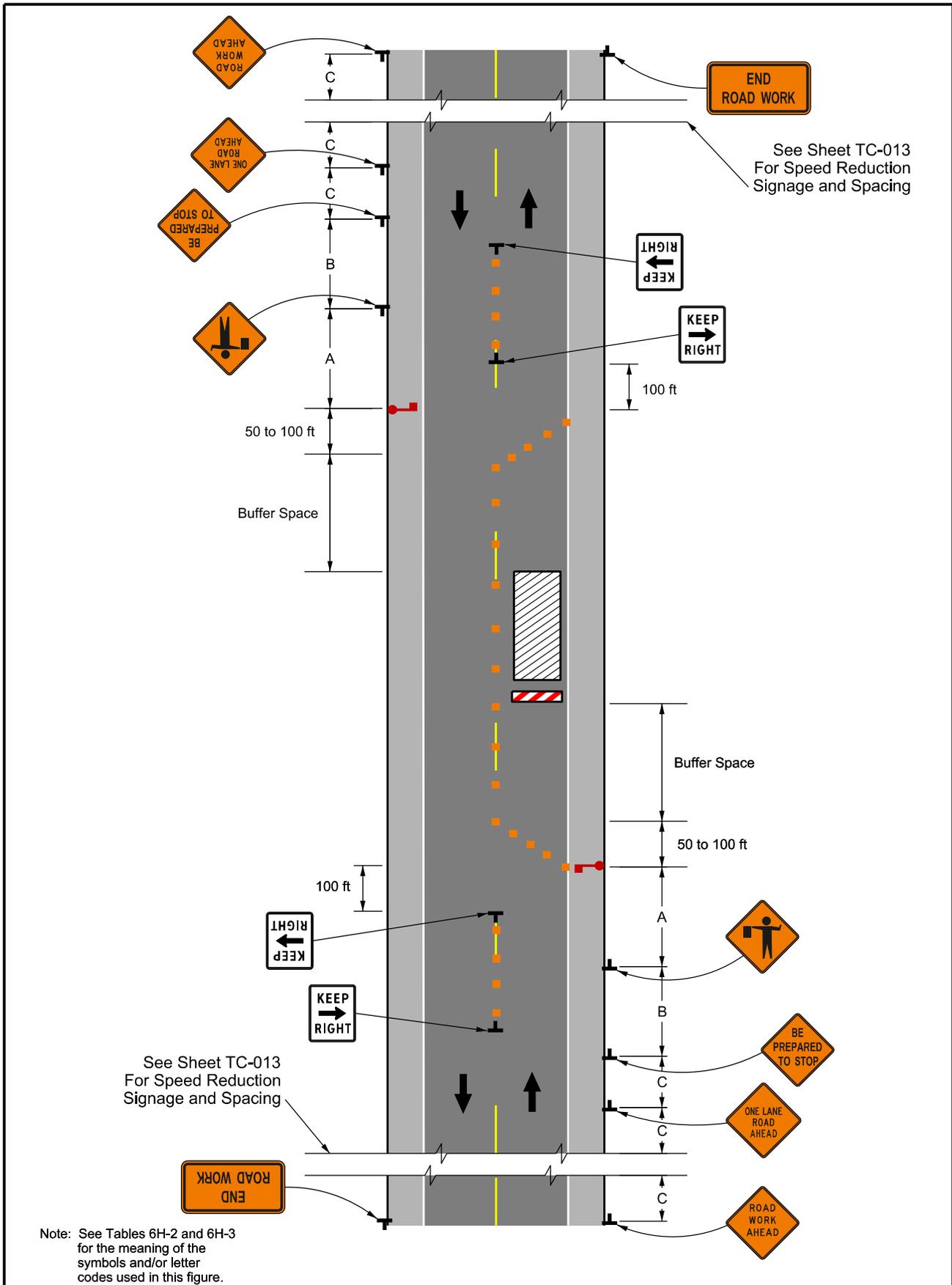
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-401



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

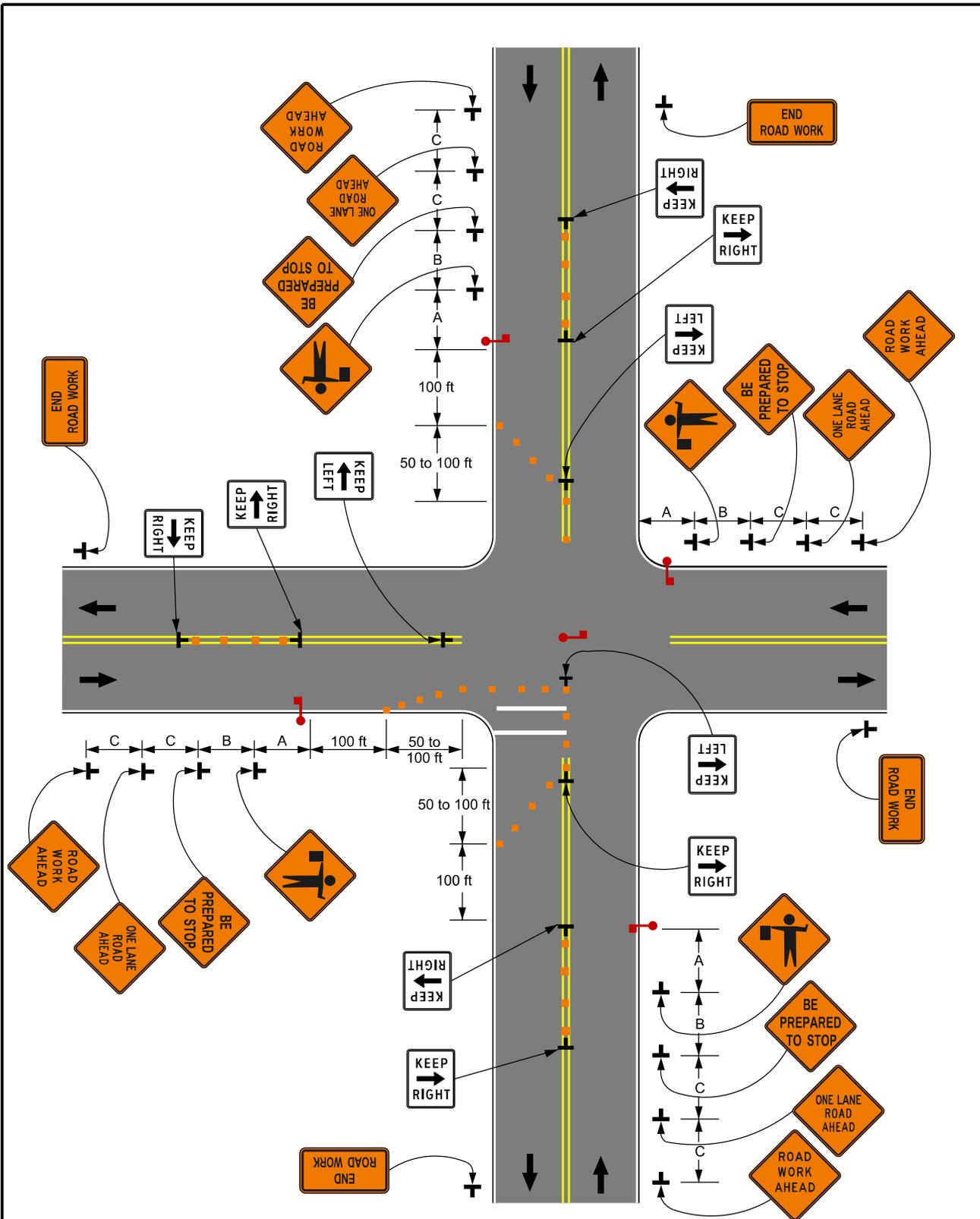


Lane Closure on Two-Lane Road Using Flaggers (Speed Greater than 45mph) Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-402



- Notes: 1. See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.
2. Depending on road conditions, flagger(s) or uniformed law enforcement officer(s) should be used to direct road users within the intersection.



Crosswalk Striping at an Intersection

Typical Application

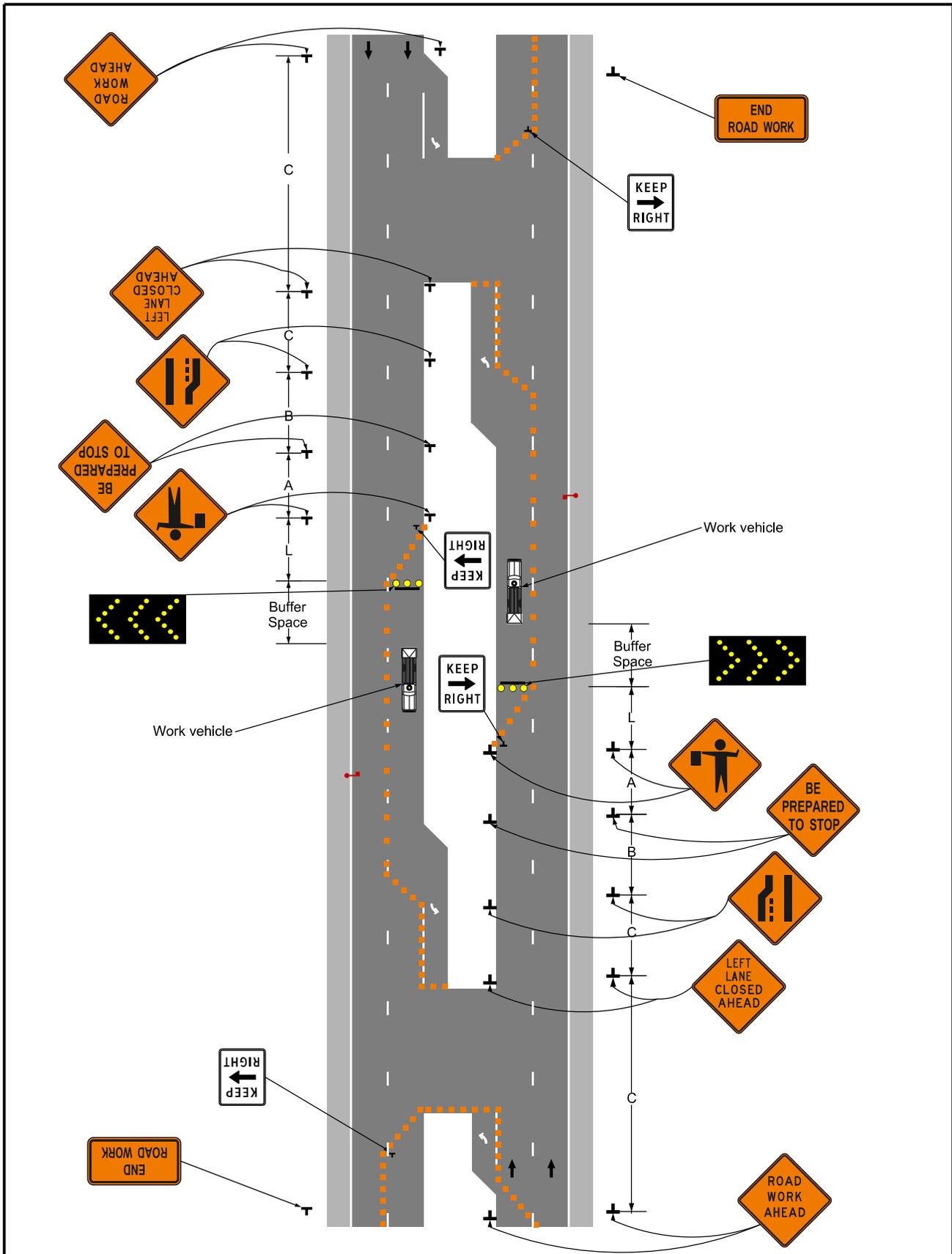
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-403



Note: See TC-013 for Speed Reduction signage and locations.

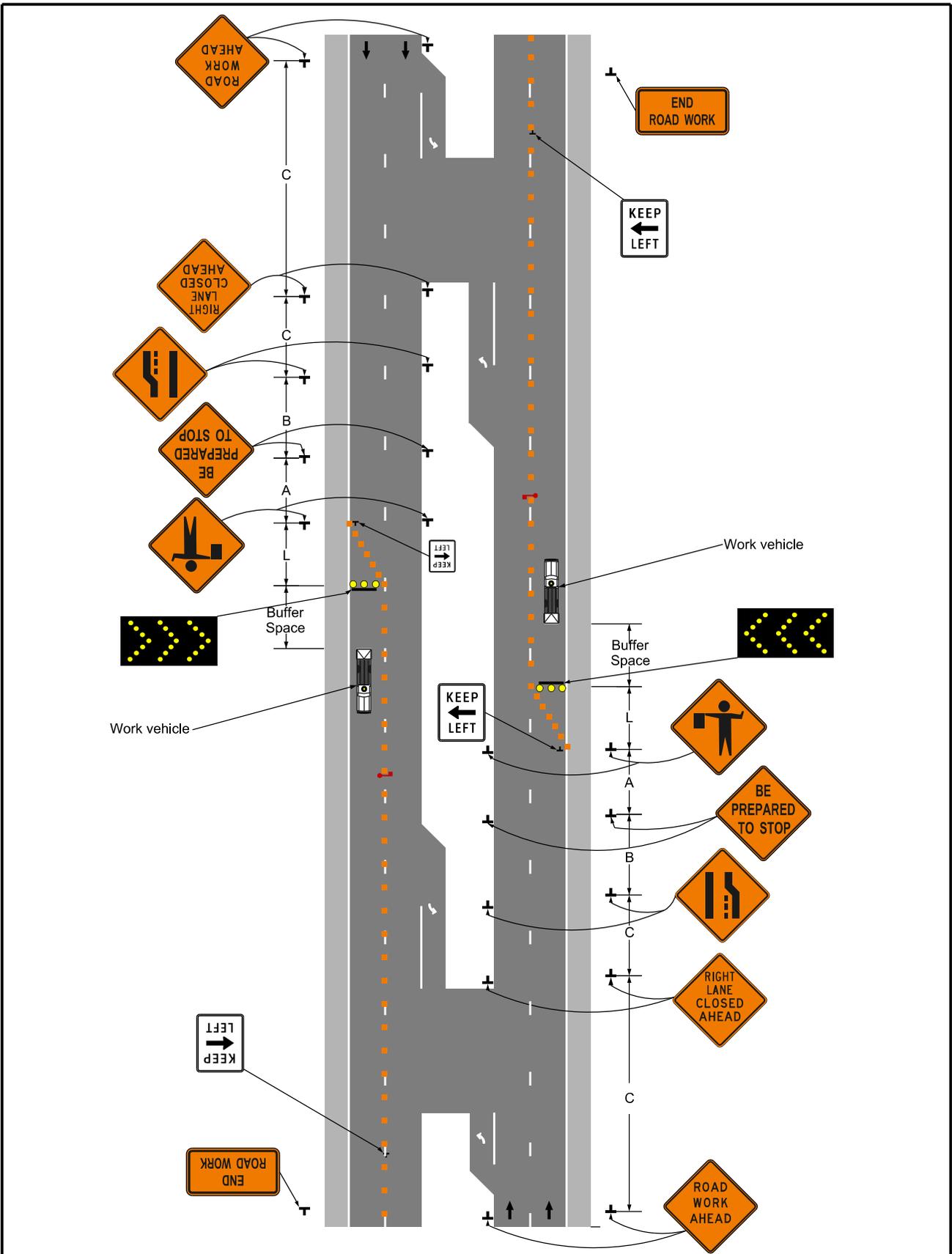


**Stationary Lane Closure
on Divided Highway
(Interior Closure)
Typical Application**

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-404



Note: See TC-013 for Speed Reduction signage and locations.

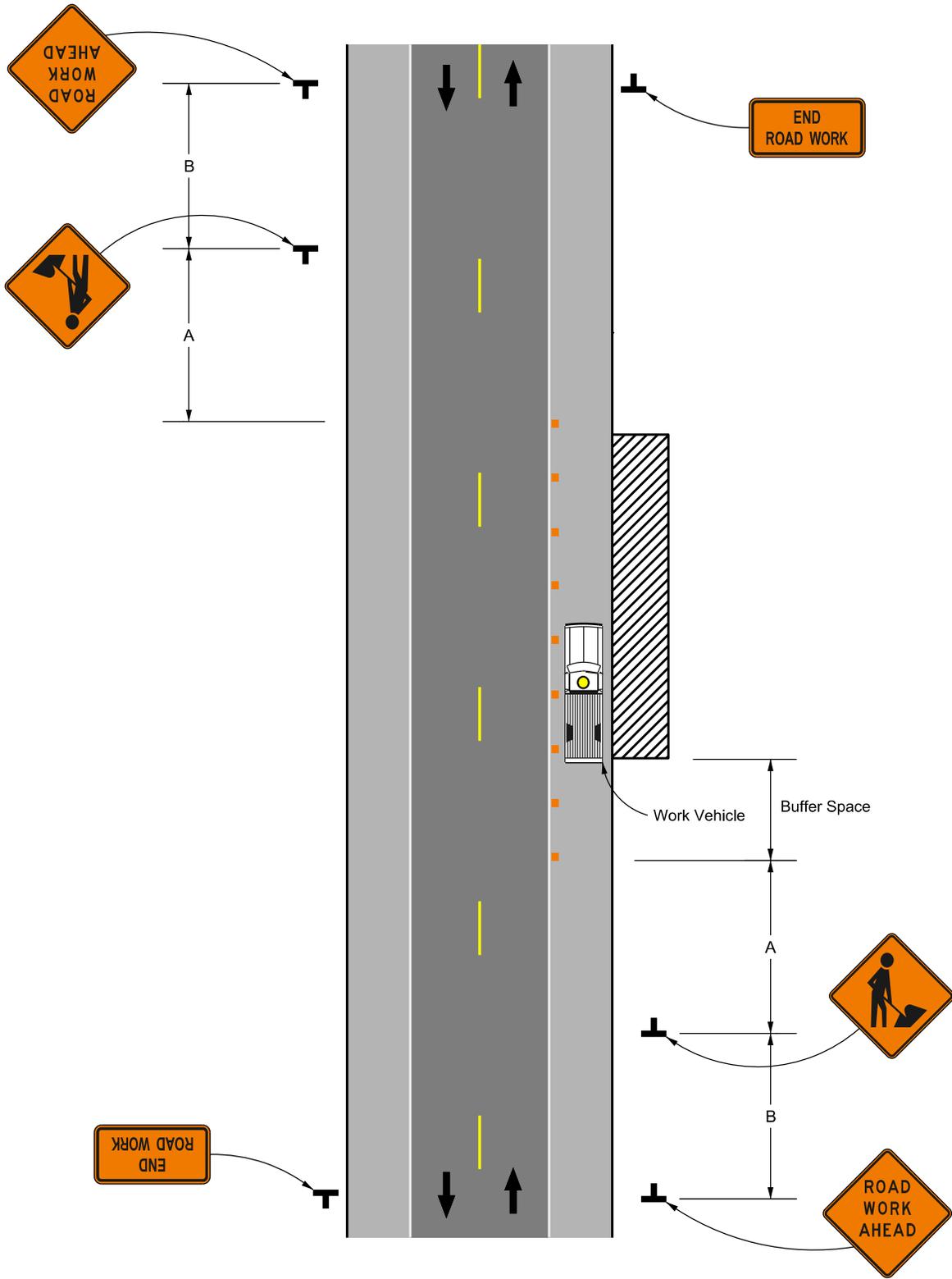


Stationary Lane Closure on Divided Highway (Exterior Closure) Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-405



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



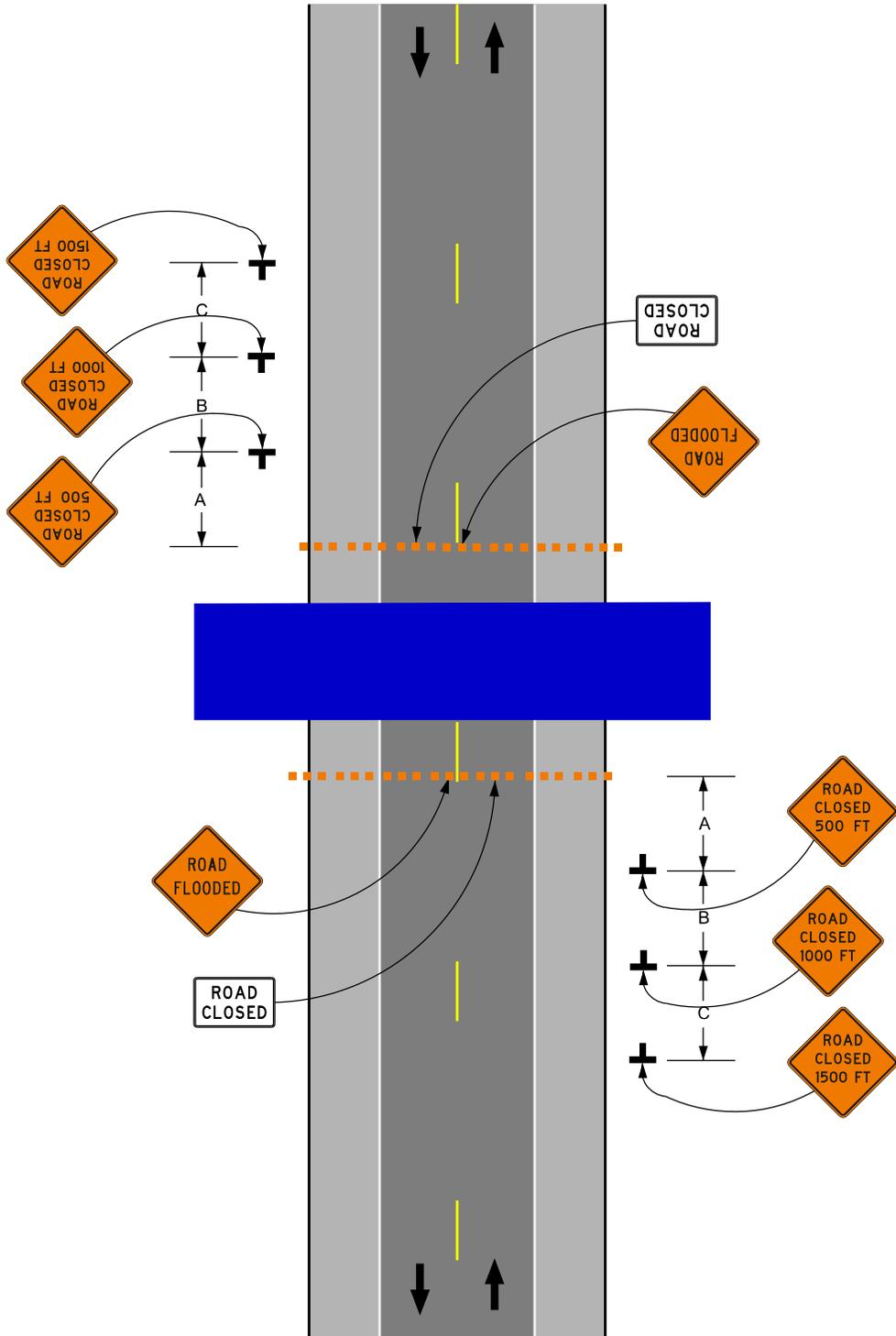
Tree Trimming

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-406



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

Note: See TC-013 for Speed Reduction signage and locations.



24-48 Hrs Road Closure River Crossing -Type II Barricades Typical Application

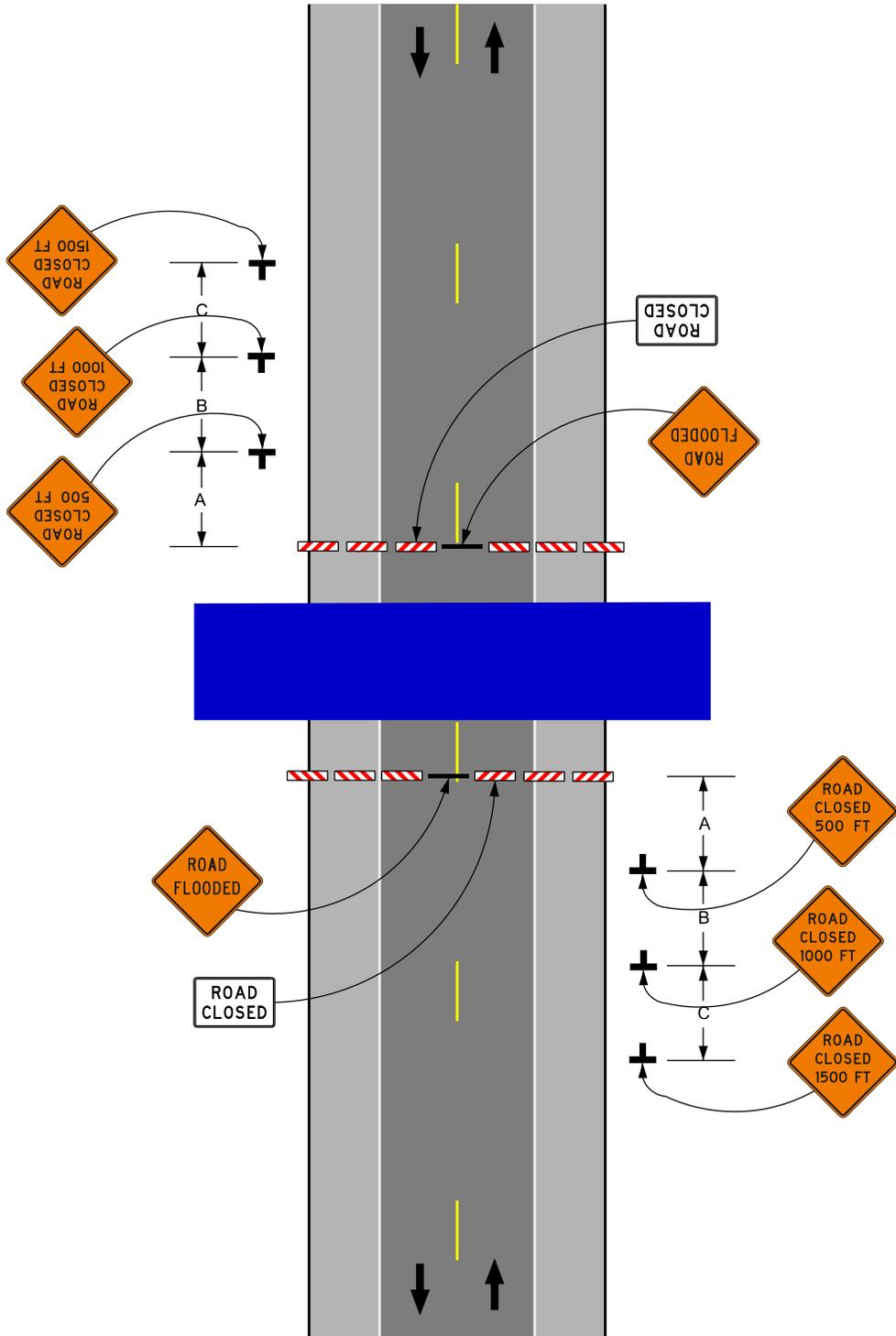
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-407a



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

Note: See TC-013 for Speed Reduction signage and locations.



Longer than 48 Hrs Road Closure River Crossing Typical Application

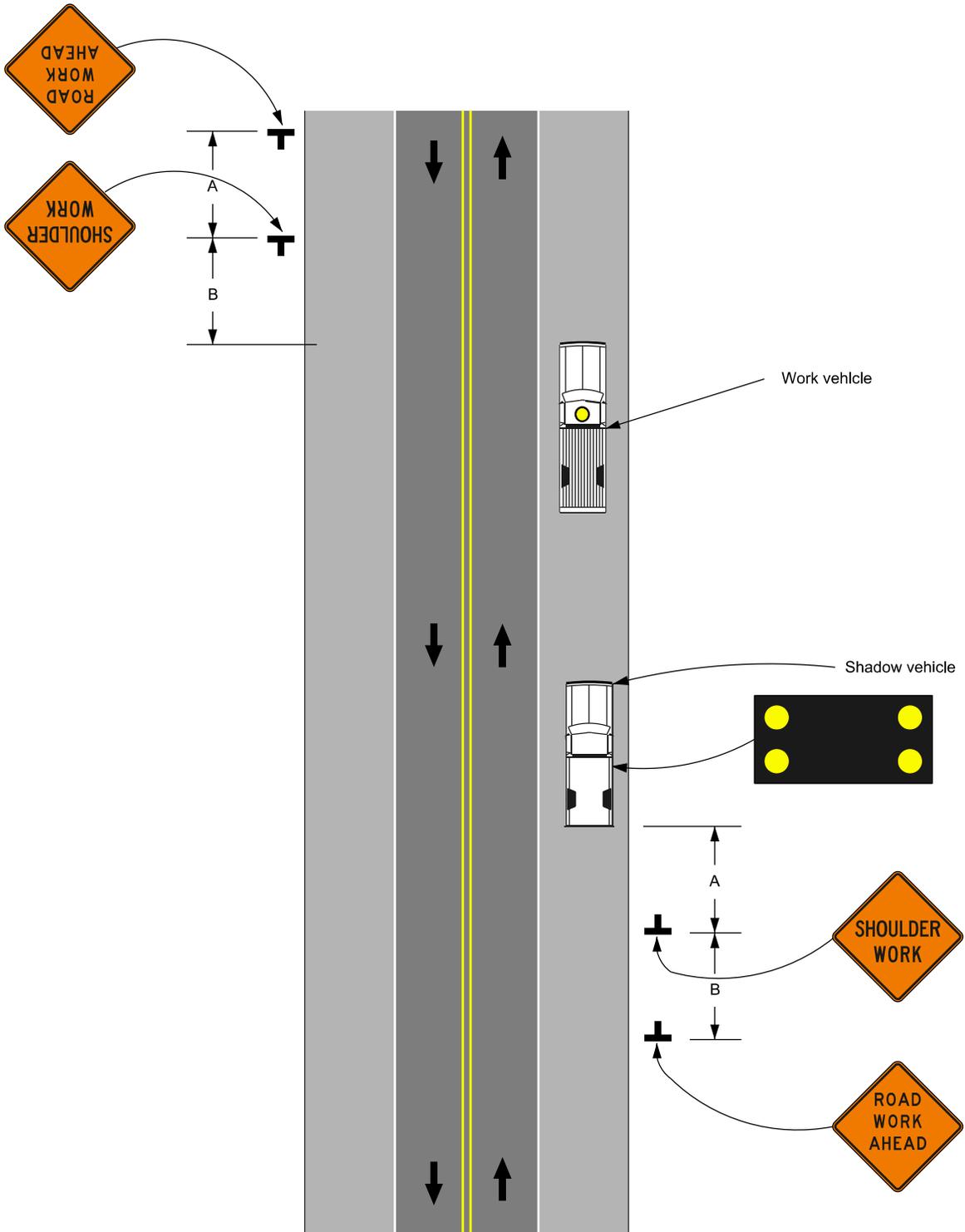
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-407b



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



Tree Trimming on Shoulder

Typical Application

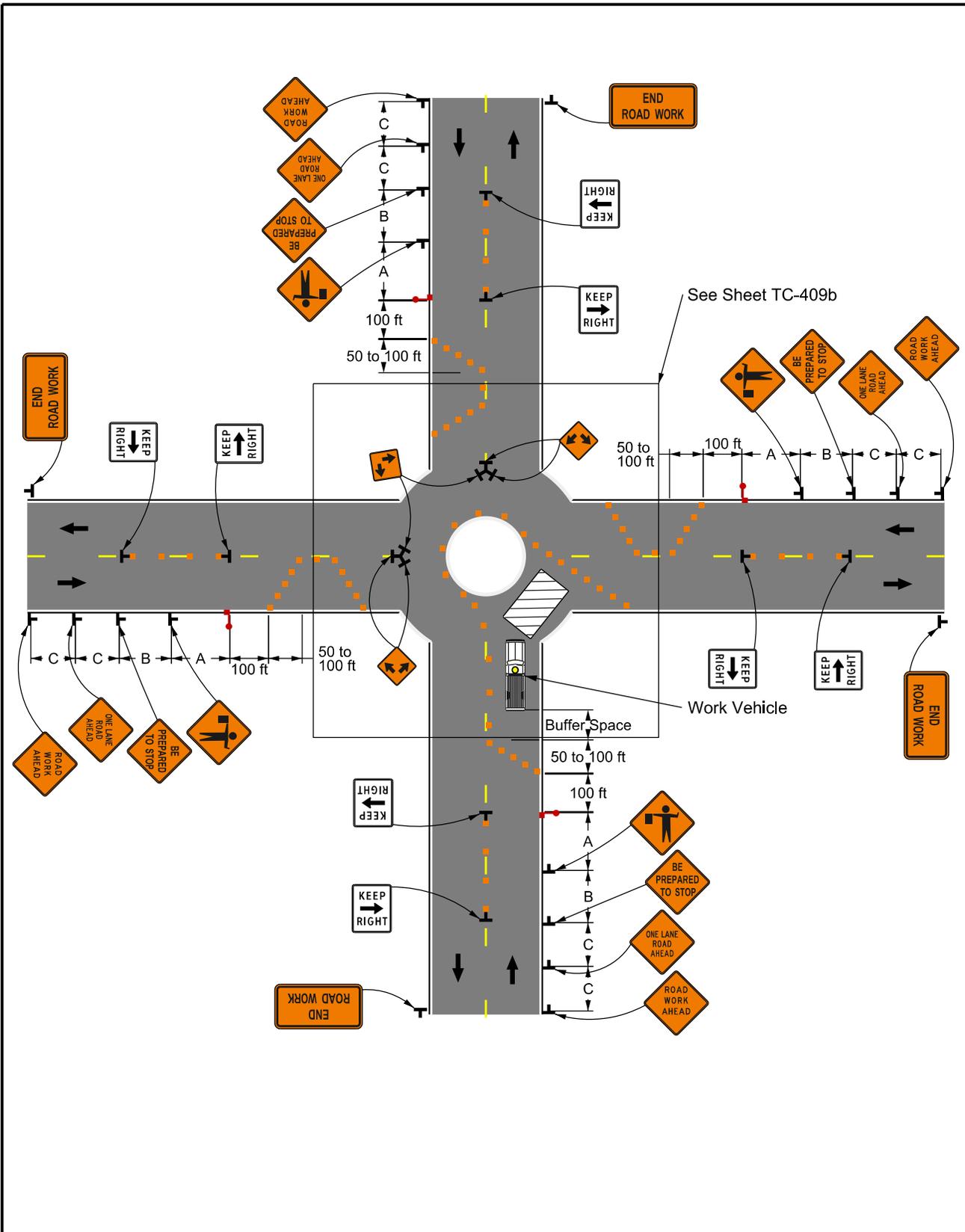
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-408



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



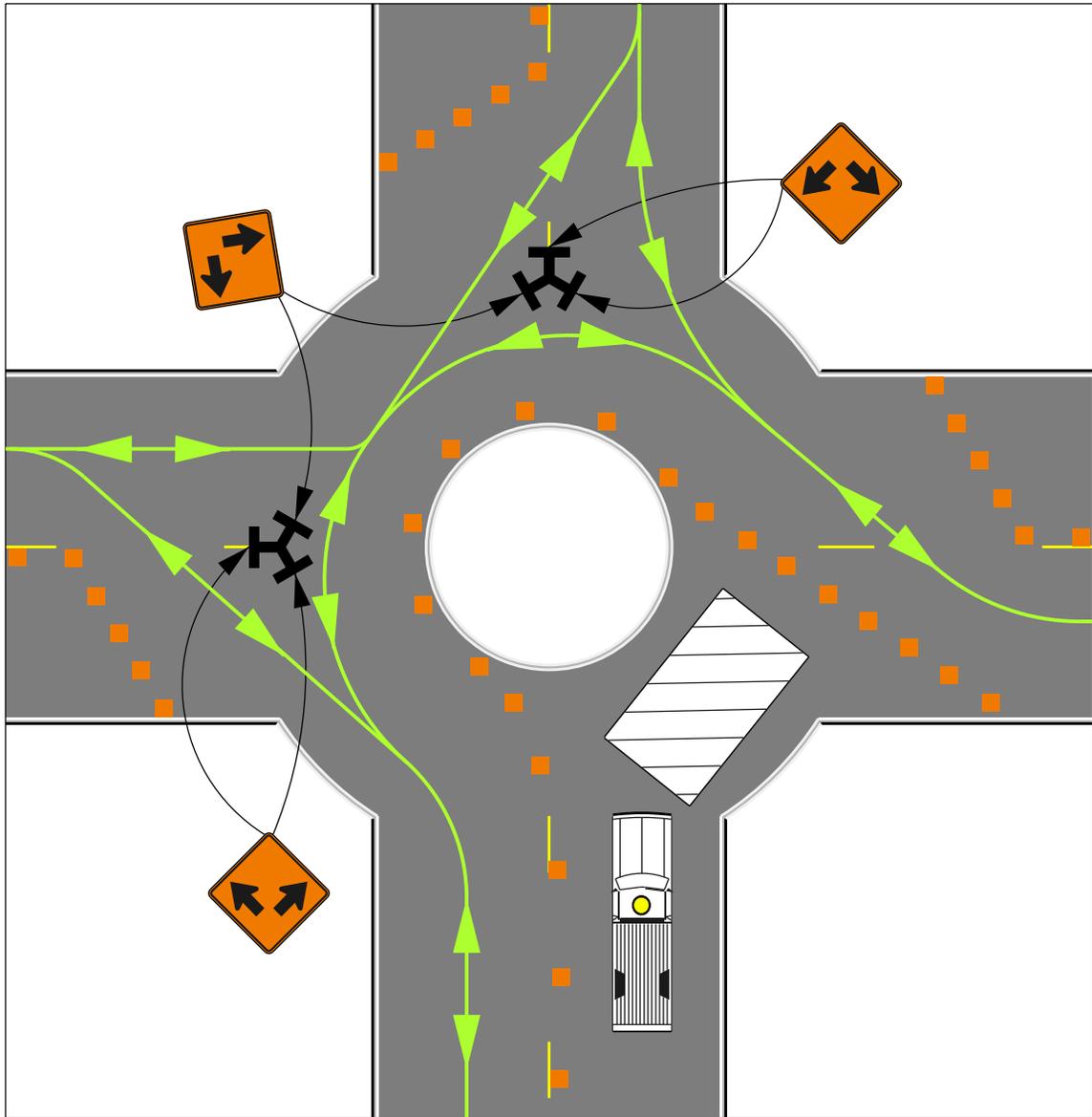
Closure at Roundabout (Overall Set-up) Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-409a

Traffic Flow in Roundabout
From Sheet TC-409a



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



**Closure at
Roundabout
(Detailed Set-up)
Typical Application**

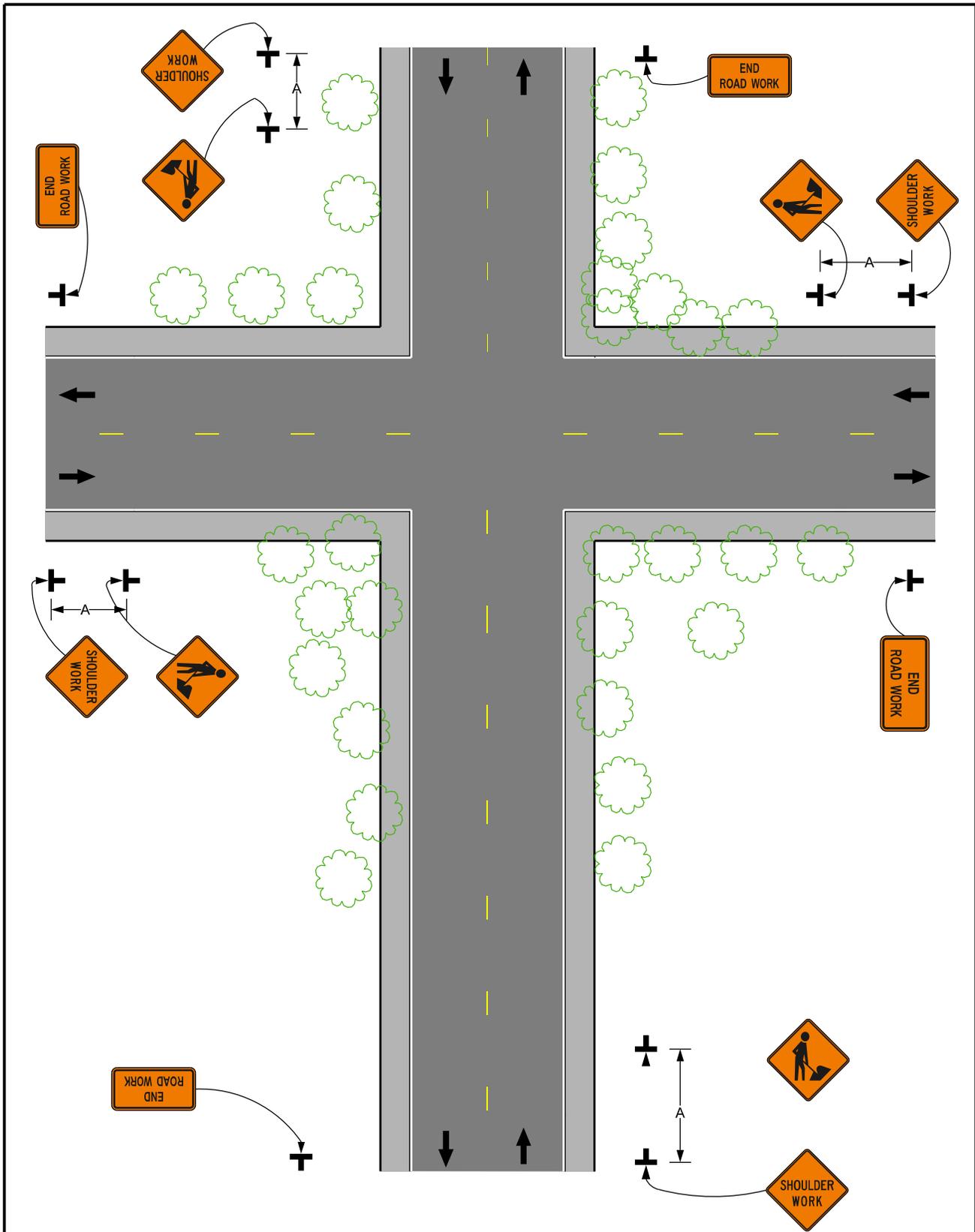
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-409b



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



Clearing or Tree Trimming at the Intersection

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

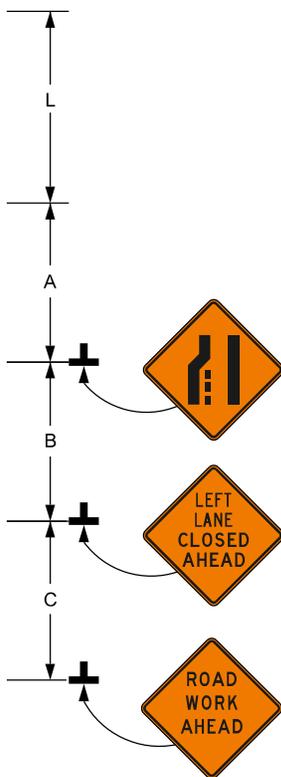
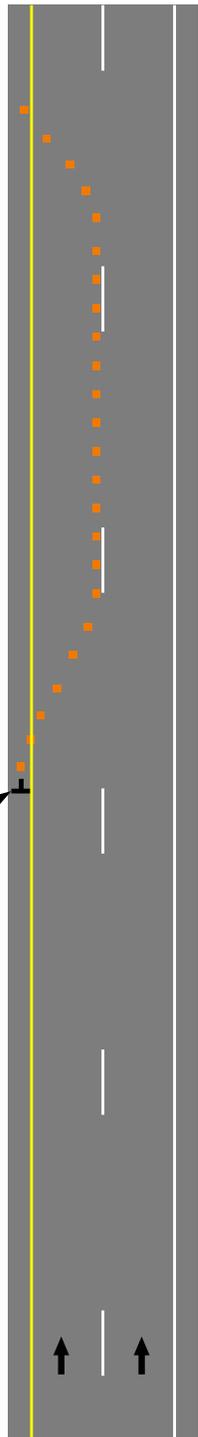
DATE

9/15

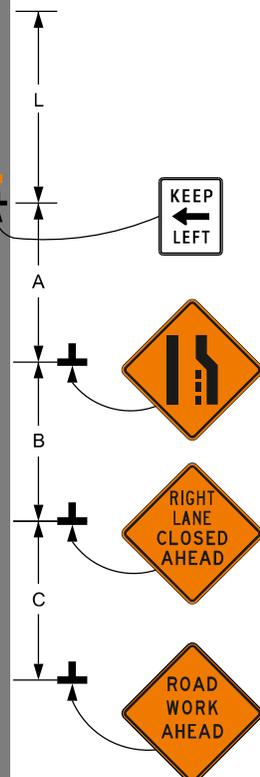
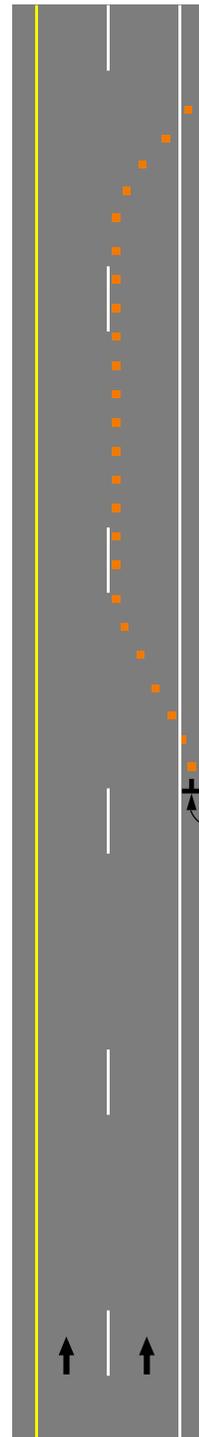
PAGE

TC-410

KEEP
→
RIGHT



KEEP
←
LEFT



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

Note: See TC-013 for Speed Reduction signage and locations.

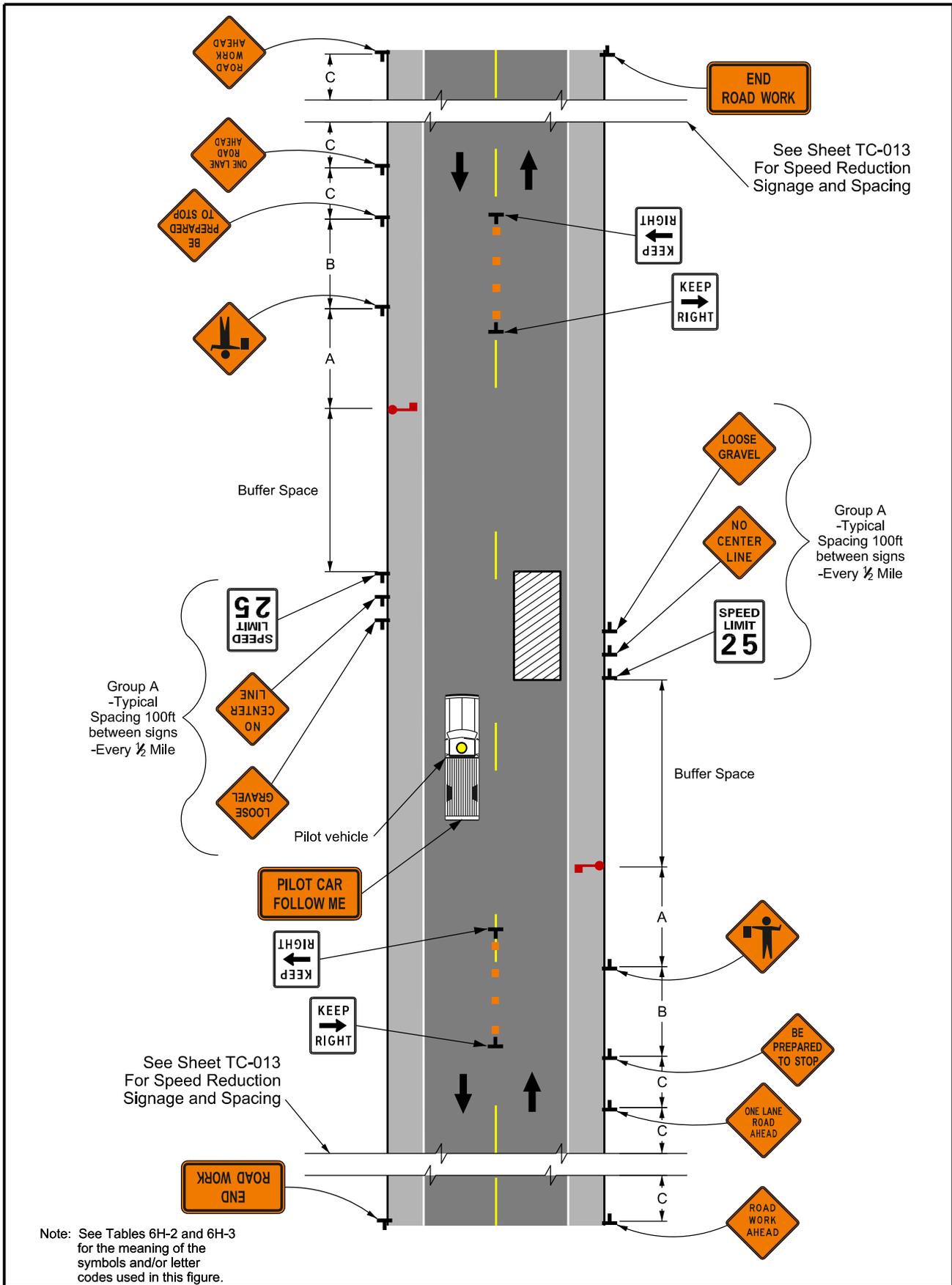


Emergency Response Right and Left Lane Closures (Less than 48 Hrs) Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE
9/15

PAGE
TC-411



Typical Pilot Car Set-up for Chip Seal

Typical Application

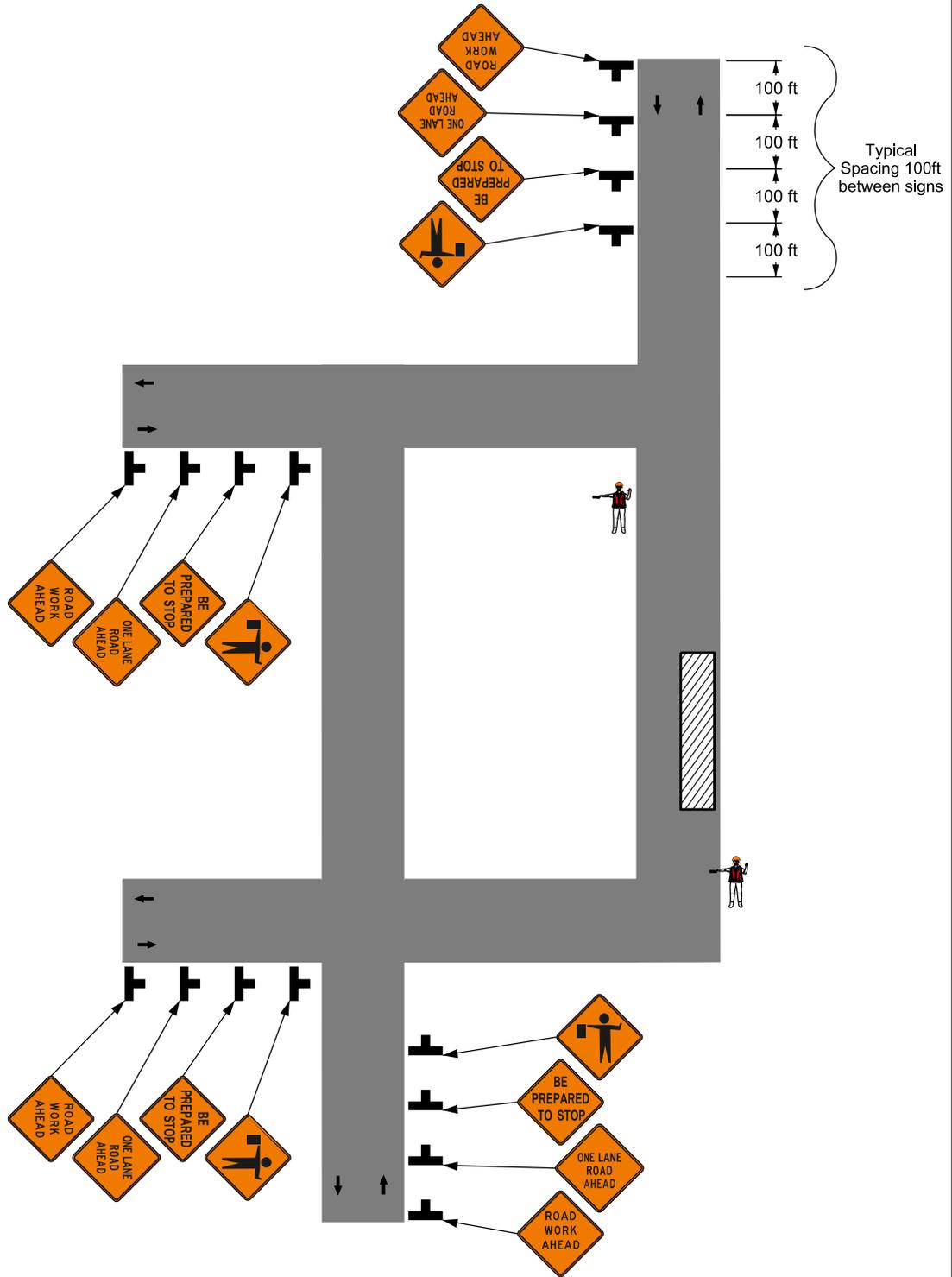
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-412



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



Interior Local Streets Chip Seal

Typical Application

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRAFFIC MANAGEMENT DIVISION

DATE

9/15

PAGE

TC-413

11. Appendix B

11.1. Forms

11.1.1. Forms

Form	Form No.
Traffic Control Plan Submittal Form (Contractor Working in County Right-of-Way)	F-100
Work Zone Traffic Control Request Form (MCDOT Construction/Maintenance Work)	F-101

11.1.2. Form Instructions

The Traffic Control Plan Submittal Form (Contractor Working in County Right –of-Way) (Form F-100) should be sent to the proper division depending on the type of work being performed, see the following:

- For Permit Projects and Transportation Improvement Projects, send the form to Burt Neptune.
- For Special Events/MCDOT In-house Construction Projects, send the form to John Counts.
- For Roadway Maintenance Projects, send the form to Mark Clark.

The Work Zone Traffic Control Request Form (Form F-101) is for MCDOT Internal Use Only.



Check One: **First Review** **Re-submittal** **Date Change**
 (Include original approved TCP)

MCDOT Permit No. TC- _____

Burt Neptune
 (602) 506-2901
BurtNeptune@mail.maricopa.gov

John Counts
 (602) 506-4624
JohnCounts@mail.maricopa.gov

Mark Clark
 (602) 506-8324
MarkClark@mail.maricopa.gov

PLEASE PROVIDE THE FOLLOWING INFORMATION

MCDOT Project Number: _____ Date: _____ Page 1 of: _____

Work Location: _____ Main Cross Roads: _____

Direction(s) Affected: W/B E/B N/B S/B Full Road Closure Special Event

Contractor: _____ Office Phone: _____ Office Fax: _____

On-site Contact Name: _____ Phone #: _____ Email: _____

24 Hour Contact Name: _____ Phone #: _____ Email: _____

Barricade Company: _____ Office Phone: _____ Office Fax: _____

24 Hour Contact Name: _____ Phone #: _____ Email: _____

Work Start Date: _____ Work End Date: _____ Work Hours: _____

MCDOT General Notes:

- The contractor shall comply with the MCDOT *Traffic Control Manual: Work Zone and Special Events, Manual for Uniform Traffic Control Devices (MUTCD)*, the Maricopa Association of Governments (MAG) *Uniform Standard Specifications and Details for Public Works Construction* and the MCDOT Supplement thereto.
- The MCDOT Project Engineer or his/her representative has the authority to initiate field changes to assure public safety.
- The Traffic Control Plan (TCP) shall include a detailed site plan showing project name, project number, north arrow, existing signing, existing striping, posted speed limits, road names, required traffic control devices, detours, tapers, pedestrian walkways, bike lanes, driveways/accesses, parking, construction fences, roadway jurisdictions and project phase of work, contact person's name and telephone number of the barricade company that is installing the traffic control devices. Indicate on the TCP the duration of the construction, work dates, hours, and phases of work.
- Ten (10) working days notice is required for all Traffic Control Plan approvals.

- and a safe drivable surface at all times.
- All construction signs and barricades shall be lighted if installed overnight.
- Open trench signs shall be installed for any open trench or pit excavation.
- Traffic control flaggers shall be certified, properly equipped and use slow/stop paddles not flags.
- The contractor shall assist in the passage of any legal over-width vehicle through their construction zone.
- Any shoulder detour longer than 5 days SHALL be paved 3-inches asphalt on native.

Maricopa County Arterial Full Closure Requirements:

- Letter from registered civil engineer for permitted work stating why road must be closed. (No other physical way to perform work)
- Documentation of the names and numbers of the departments notified (Fire, Police, Transit Bus Routes, Trash, School District & any Businesses in the area)
- Hotline numbers on signs sending 24-hour complaints to the contractor (NOT to the County).
- Variable Message Sign or Static board showing the duration of the closure. Ten (10) working days advance notice of a closure of the arterial road.
- **ON SITE PRE-CONSTRUCTION MEETING REQUIRED:** Traffic control inspector must survey the location to determine if a full closure is necessary. (This must be done prior to placing signage to show closure)

MCDOT Special Requirements:

- Bump signs shall be installed for all steel plates in the roadway. Steel plates shall be flush with the surface on all paved roadways to cover hazards and restore normal traffic flows during non-work times.
- The contractor shall maintain shoulder for dust control

**Work Zone
Traffic Control
Request Form**

Revised: 08/21/13

On Road		From		To		Date of this Request	
Date of Job Start		Daily time of Job Starts		Daily time of Job Ends		Duration of job (specify # of days, weeks)	
Est. End Date of Job		Meeting Location in Field		TCP Required ?		Job #	
Requested By		Job Contact (Name & #)		Contact supervisor/name phone #		TCP for Overnight ?	
Type Of Job:		Check All That Applies / Type of Job and Action Needed				Action	
Bridge Work	<input type="checkbox"/>	Graffiti Removal	<input type="checkbox"/>	Road Surface Treatment	<input type="checkbox"/>	Road Closure	<input type="checkbox"/>
Cattle Guard Repair	<input type="checkbox"/>	Guardrail Repair	<input type="checkbox"/>	Shoulder Work	<input type="checkbox"/>	Lane Closure	x
Compaction Failure	<input type="checkbox"/>	Loading / Dumping	<input type="checkbox"/>	Sidewalks	<input type="checkbox"/>	Basic WZ / TC	<input type="checkbox"/>
Coring	<input type="checkbox"/>	Mobile Operation	<input type="checkbox"/>	Street Sweeping	<input type="checkbox"/>	Flagger Operation	x
Culverts/Pipe/Grills Repairs	<input type="checkbox"/>	Monument Work	<input type="checkbox"/>	Striping Application	<input type="checkbox"/>	Shoulder Work	<input type="checkbox"/>
Debris Removal	<input type="checkbox"/>	Patching	<input type="checkbox"/>	Survey Work	<input type="checkbox"/>	Traffic Diversion	<input type="checkbox"/>
Ditch Work	<input type="checkbox"/>	Rip Rap	<input type="checkbox"/>	Traffic Signals	<input type="checkbox"/>	4-Way Stop	<input type="checkbox"/>
Fencing	<input type="checkbox"/>	Road Erosion	<input type="checkbox"/>	Tree/Saguaro Removal	<input type="checkbox"/>	Other	<input type="checkbox"/>
Tree Trimming	<input type="checkbox"/>	Truck Crossing	<input type="checkbox"/>	J-Jon on Site	<input type="checkbox"/>		<input type="checkbox"/>
Description Of Work (This Information REQUIRED to Schedule Job)							
Do Not Write Below This Line - (Work Zone Personnel Use Only)							
Truck #:		WZ Arrival Time:		WZ Job Start:		WZ Job End Time:	
Assign to:				Completed by:			
CR # :		Tracking #:		Date:		Signature	
Job Canceled by:		Canceled Date :		Canceled Time :		Contacted by:	
Job on Hold:		Job on Hold Date:		Job on Hold Time:		Resume to work date:	
Check All That Applies:				Equipment Needed:			
Button up AM & PM	<input type="checkbox"/>	Pavement Bypass	<input type="checkbox"/>	# of Techs	<input type="checkbox"/>	# Sandbags	<input type="checkbox"/>
Clear Job Site	<input type="checkbox"/>	Pilot Vehicle	<input type="checkbox"/>	Truck #	<input type="checkbox"/>	# Flags	<input type="checkbox"/>
Clear stock pile	<input type="checkbox"/>	Pre - Warning	<input type="checkbox"/>	# T-2	<input type="checkbox"/>		<input type="checkbox"/>
Flagger	<input type="checkbox"/>	Road Closure	<input type="checkbox"/>	# T-3	<input type="checkbox"/>		<input type="checkbox"/>
Football	<input type="checkbox"/>	Set & Leave	<input type="checkbox"/>	# Vertical	<input type="checkbox"/>		<input type="checkbox"/>
Jersey Barriers	<input type="checkbox"/>	Signs on Channel	<input type="checkbox"/>	# Lights	<input type="checkbox"/>		<input type="checkbox"/>
Lane Restriction	<input type="checkbox"/>	Speed Monitor	<input type="checkbox"/>	# Cones	<input type="checkbox"/>		<input type="checkbox"/>
Mobile	<input type="checkbox"/>	VMS (Trailer)	<input type="checkbox"/>	# Wind masters	<input type="checkbox"/>		<input type="checkbox"/>
C/M crew arrival time:				C/M crew departure time:			

Please send to the following: Manuel Verduzco-Cell#: 602-723-5605, Ed Cortez-Cell#: 602-722-6054, Reyes Lara-Cell # 602-525-8215, Alfie Barajas-Office#: 602-506-0442/Fax#: 602-506-3785

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