



Transmittal Number 09-070	Date July 2009
Publication Distribution To: All holders of the <i>Work Zone Traffic Control Guidelines</i>	
Publication Title <i>Work Zone Traffic Control Guidelines, M 54-44.02</i>	Publication Number M 54-44
Originating Organization Maintenance and Operations Division, Traffic Office	

**Remarks:**

The *Work Zone Traffic Control Guidelines* has been revised. *Please be advised that this revision is electronic only.* To access this manual electronically, go to:

<http://www.wsdot.wa.gov/publications/manuals/fulltext/M54-44/Workzone.pdf>

**Who to Contact:**

Please contact Marty Weed at 360-705-7293 or [weedm@wsdot.wa.gov](mailto:weedm@wsdot.wa.gov) with comments, questions, or suggestions for improvement to the manual.

**Instructions:**

Page numbers and corresponding sheet-counts are given in the table below to indicate portions of the *Work Zone Traffic Control Guidelines* that are to be removed and inserted to accomplish this revision.

Chapter	Remove		Insert	
	Pages	Sheets	Pages	Sheets
Cover and Title Page	1-4	2	1-4	2
Contents	iii – iv	1	iii – iv	1
Chapter 3	3-1 – 3-22	11	3-1 – 3-22	11

Copies of this manual may be purchased for a fee from:

Washington State Department of Transportation  
 Administrative and Engineering Publications  
 PO Box 47304  
 Olympia, WA 98504-7304  
**Phone:** 360-705-7430  
**Fax:** 360-705-6861  
**E-mail:** [engrpubs@wsdot.wa.gov](mailto:engrpubs@wsdot.wa.gov)

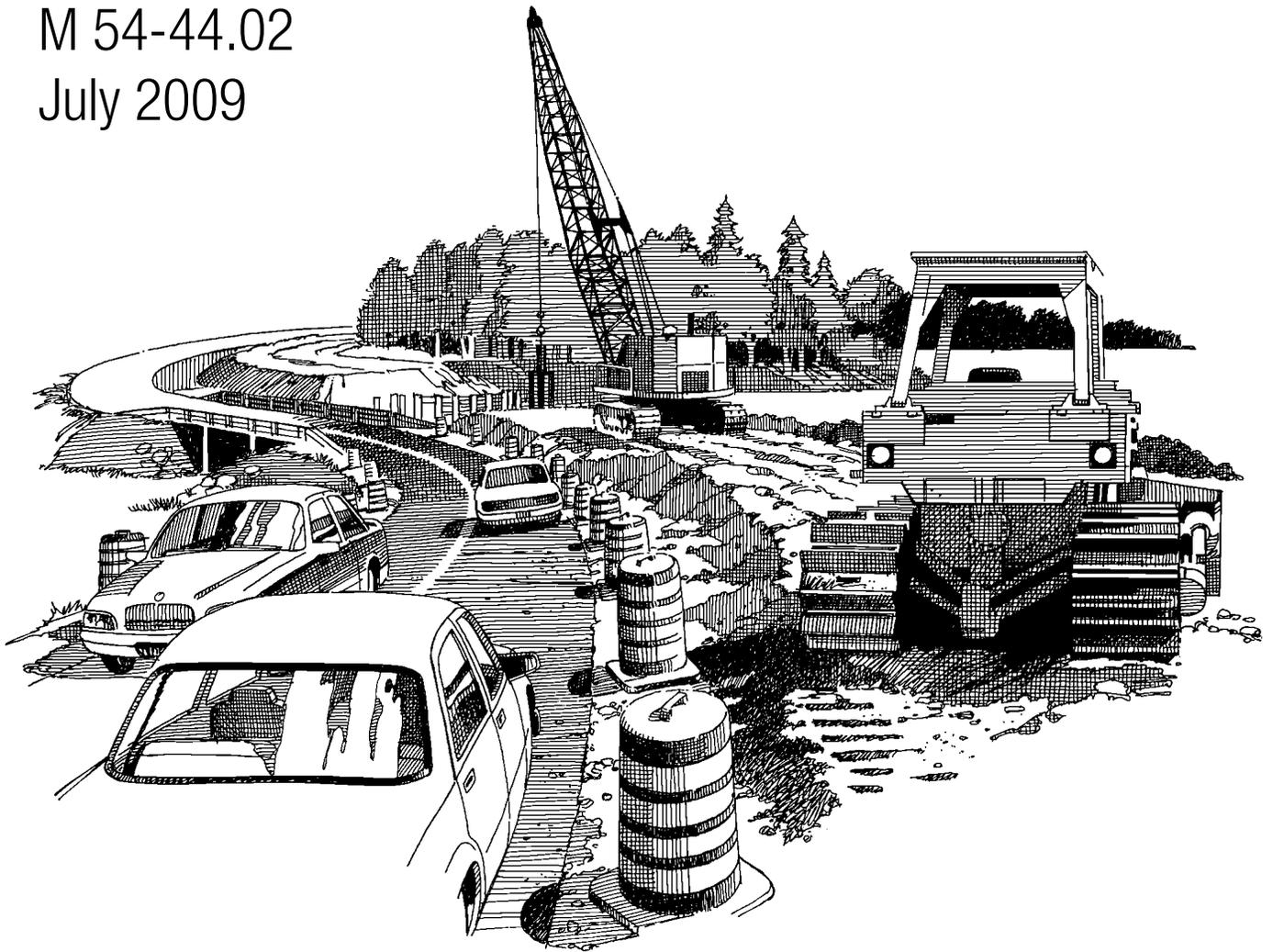
Distributed By Administrative and Engineering Publications	Phone Number 360-705-7430 Fax: 360-705-6861	Signature
---	---	-----------



# Work Zone Traffic Control Guidelines

M 54-44.02

July 2009



**Washington State  
Department of Transportation**





Washington State  
Department of Transportation

---

# **Work Zone Traffic Control Guidelines**

M 54-44.02

July 2009

**Maintenance and Operations Division**

Traffic Operations

## **Americans with Disabilities Act (ADA) Information**

Materials can be provided in alternative formats for persons with disabilities by contacting the ADA Compliance Officer via telephone at 360-705-7097 or by e-mail to Shawn Murinko at [murinks@wsdot.wa.gov](mailto:murinks@wsdot.wa.gov).

### **Title VI Notice to Public**

It is the Washington State Department of Transportation's (WSDOT) policy to assure that no person shall, on the grounds of race, color, national origin and sex, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against under any of its federally funded programs and activities. Any person who believes his/her Title VI protection has been violated may file a complaint with WSDOT's Office of Equal Opportunity (OEO). For Title VI complaint forms and advice, please contact OEO's Title VI Coordinator at 360-705-7098.

To get the latest information on WSDOT administrative and engineering manuals, sign up for e-mail updates for individual manuals at:  
[www.wsdot.wa.gov/publications/manuals/](http://www.wsdot.wa.gov/publications/manuals/)

Washington State Department of Transportation  
Administrative and Engineering Publications  
PO Box 47304  
Olympia, WA 98504-7304

Phone: 360-705-7430

Fax: 360-705-6861

E-mail: [engrpubs@wsdot.wa.gov](mailto:engrpubs@wsdot.wa.gov)

Internet: [www.wsdot.wa.gov/publications/manuals/](http://www.wsdot.wa.gov/publications/manuals/)

# Contents

---

	Page
<b>Chapter 1 General Information</b> .....	1-1
1.1 Introduction .....	1-1
1.2 Considerations .....	1-2
1.3 Work Duration .....	1-3
1.4 Personal Attributes .....	1-4
1.5 Equipment .....	1-4
1.5.1 Traffic Control Device Crashworthy Requirements .....	1-4
1.5.2 Condition and Care of Equipment .....	1-4
1.5.3 Signs .....	1-4
1.5.4 Vehicles .....	1-5
1.5.5 Truck Mounted Attenuators .....	1-6
1.5.6 Portable Changeable Message Signs (PCMS) .....	1-7
1.5.7 Arrow Panel .....	1-7
1.5.8 Channelizing Devices .....	1-8
1.5.9 Temporary Concrete Barrier .....	1-9
1.5.10 Portable Steel Barrier .....	1-9
1.5.11 Water Filled Barrier .....	1-9
1.5.12 Barricades .....	1-10
1.5.13 Warning Lights .....	1-10
1.5.14 Flares .....	1-10
1.5.15 Temporary and Portable Signal Systems .....	1-11
1.5.16 Automated Flagger Assistance Device (AFAD) .....	1-11
1.5.17 Highway Advisory Radio (HAR) .....	1-11
1.5.18 Specific Warning Sign Requirements .....	1-11
1.6 Personal Protective Wear .....	1-12
1.7 Flagging .....	1-12
1.7.1 Flagger's Rules of Conduct .....	1-13
1.8 Pedestrians, Bicycles, and Other Roadway Users .....	1-14
1.8.1 Pedestrians .....	1-15
1.8.2 Bicycles .....	1-15
1.8.3 Motorcycles .....	1-15
1.8.4 Schools .....	1-16
1.8.5 Oversize Loads .....	1-16
1.9 Additional Work Zone Considerations .....	1-16
1.9.1 Work Zone Speed Limits .....	1-16
1.9.2 Worker Protection .....	1-17
1.9.3 Buffer Space and Shy Distance .....	1-17
1.9.4 Lane Closure Setup/Takedown .....	1-17
1.9.5 Survey Work Zones .....	1-18
1.9.6 Public Information .....	1-18
1.9.7 Roundabout Traffic Control .....	1-19
1.9.8 Road Closures .....	1-19
1.9.9 Detour .....	1-20
1.9.10 Special Event .....	1-20
1.9.11 Work Over Traffic .....	1-20

	Page
<b>Chapter 2 Stationary Work Zones</b> .....	2-1
<hr/>	
<b>Chapter 3 Short Duration Work Zones</b> .....	3-1
3.1 Introduction .....	3-1
3.2 Guidance .....	3-1
3.3 Key Elements of Short Duration Work Zones .....	3-3
3.4 Short Duration Work Zone Condition .....	3-3
3.5 Consideration and Assessment of Traffic Volumes in Work Zones .....	3-4
3.5.1 Work Zone Type .....	3-5
3.5.2 Traffic Conditions .....	3-5
3.6 Very Short Duration Work Zones .....	3-7
3.7 Short Duration Work Zone Rules .....	3-8
3.8 Short Duration Don'ts and Do's .....	3-9
3.9 Short Duration and Very Short Duration TCPs .....	3-10
<hr/>	
<b>Chapter 4 Mobile Operations</b> .....	4-1
<hr/>	
<b>Chapter 5 Intersection Operations</b> .....	5-1
<hr/>	
<b>Chapter 6 Special Details and TCPs</b> .....	6-1
TCD 7 – Rolling Slowdown .....	6-9
TCD 8 – Emergency Operations .....	6-12
<hr/>	
<b>Appendices</b>	
Appendix 1-1 Taper/Channelizing Device Table .....	1-1-1
Appendix 2-2 Channelizing Device Application Matrix .....	2-2-1
Appendix 3-3 Taper and Buffer Space Details .....	3-3-1

- 3.1 Introduction
- 3.2 Guidance
- 3.3 Key Elements of Short Duration Work Zones
- 3.4 Short Duration Work Zone Condition
- 3.5 Consideration and Assessment of Traffic Volumes in Work Zones
- 3.6 Very Short Duration Work Zones
- 3.7 Short Duration Work Zone Rules
- 3.8 Short Duration Work Zones – Do’s and Don’ts
- 3.9 Short Duration and Very Short Duration TCPs

### 3.1 Introduction

Short duration work zones are planned work activities that last up to 60 minutes. Due to the short work time, simplified traffic control set-ups are allowed to reduce worker traffic exposure. The time it takes to set up a full complement of signs and devices could approach or exceed the time required to perform the work.

Careful consideration of traffic and roadway conditions must be given to each work zone prior to selecting the traffic control set-up. Shoulder work and low-speed, low-volume traffic conditions may require only the work vehicle hazard beacon and personal protective equipment. High-speed, high-volume lane work may require a full lane closure set-up, even though the work duration may be 60 minutes or less. Remember, short duration work is not a “short-cut.” Instead, it is a method that reduces worker exposure to traffic hazards by using larger, more dominant and mobile equipment instead of many smaller devices (cones may still be recommended since they are quick to set up for small work zones).

Examples of short duration work zone operations include re-lamping, pothole patching and other minor repairs, surveying, bridge inspection, field recon, pre-work layout, etc. Emergencies and incident response are not short duration work zones.

### 3.2 Guidance

The following guidance applies standards from the MUTCD to provide more specific direction for short duration work zones. It also provides a rationale to assist with selection of appropriate short duration traffic control and safety measures. The included guidance and direction, rules, consideration chart and example TCPs should lead to an informed choice. Remember, there is no single solution that fits all work zones.

- Consider a rolling slowdown operation as shown on TCD 7 for those work operations of a very short duration in which traffic control measures would take more time than the actual work. Typically, rolling slowdowns are desirable for difficult access work zones, such as center lanes or closing all lanes at once on multi-lane highways.
- Consider stationary work zone measures with a full compliment of signs and devices. Some work operations, traditionally classified as short duration, may be conducted as longer term stationary work by linking several work areas together under a lane or shoulder closure. Advantages of linking work operations may include reducing exposure of workers to traffic, efficiencies in completing tasks concurrently, reducing the number of lane closures in the same area, and overall reduction in impacts to traffic.
- Consider mobile operations. Other short duration operations may be conducted as mobile operations by progressing through several work areas and making intermittent stops. Advantages are shortened work operations to install traffic control devices and improved worker safety through use of mobile equipment (TMAs, PCMSs, mobile work vehicles, etc.).
- Consider alternative work operations, materials, and equipment, such as:
  - Combining crews to accomplish work using mobile or stationary work zones, weekend or night closures, and at other identified work locations or on operations that may be difficult to accomplish with a small crew.
  - Identifying “red zones” where short duration work zones are not desirable due to poor traffic conditions (high volume, high speed, weaving areas, bridges, interchanges, etc.).
  - Creating a specialized work zone traffic control crew to support work operations. The specialized team can provide a higher level of efficiency and safety for a crew focused only on the work itself. This can also reduce the overall time duration and worker exposure to traffic hazards.
- Consider resources needed for quick response work (non-emergency):
  - It is important to differentiate between an actual emergency and an emergent condition. An emergency requires immediate response to save lives or prevent serious injury using whatever resources are available, usually in response to a crash or incident. An emergent condition requires an expedient yet planned response to a situation that has the potential to cause a crash, or damage needing quick repair. Most “call outs” or damage reports fall into the emergent condition category and although serious to varying degrees, still allow time to plan a reasonable short duration work zone response, even if additional resources are needed after evaluation.

- These operations may be referred to as “call outs,” requiring a quick response to a report of debris, urgent repairs, or other situation where the exact nature of the work or location may not be completely known.
- An on-site assessment may allow work to proceed with available equipment and devices. Strategic placement of the work vehicle with warning beacon is important. Devices and signs may also be needed. If work is expected to last more than 60 minutes, additional resources may be needed to implement a traditional stationary work zone. Work may be delayed until the proper work zone equipment and devices are available. Assistance from WSDOT Incidence Response may also be appropriate.

### 3.3 Key Elements of Short Duration Work Zones

- **Work Location** – This element may be the most obvious but is also the most important, at least initially, since it establishes the relationship to the next three elements. The location directly influences the assessment of hazards, protection and warning. Unique locations with narrow shoulders, bridges, undefined shoulders (no edge stripe), poor sight distance, tight radius curves, etc. require extra consideration.
- **Hazards to Workers and to Traffic** – Traffic volume and speed are the primary hazard concerns for workers in short duration work zones, while unexpected workers or equipment are the primary hazard for drivers.
- **Protection** – Positive worker protection is always recommended when practical but not necessarily required for less hazardous work zones. The use of a properly placed work vehicle can offer valuable protection in any condition.
- **Warning** – Advance warning to drivers is required when working within 15 feet of the edge of the traveled way. Assuming adequate sight distance, the work vehicle warning beacon can provide this warning in short duration zones. Sign(s) may be needed for areas with reduced sight distance.
- **Duration** – As mentioned in previous guidance, short duration work zones can offer safety and mobility benefits, but not at the risk of too much worker exposure to hazards.

### 3.4 Short Duration Work Zone Condition

Short duration work zones are categorized into three relative condition types. This helps establish a practical application level of traffic control and safety devices based on hazard, protection and warning levels related to work location and duration. The MUTCD allows for simplified traffic control procedures for short duration work, but does not go into detail on what those procedures might be. When selecting a TCP, refer to Work Zone Condition guidance located at the upper, left-hand portion of the TCP.

The condition levels are:

**A** – Represents the lowest level of work zone impacts and is typified by:

- Low traffic speed and volume.
- Minimum levels of warning, protection and hazards. A work vehicle with warning beacon and personal protective equipment may be adequate.

**B** – Represents moderate work zone impacts and is typified by:

- Low or high traffic speed with low to moderate volumes.
- Moderated levels of warning and protection, such as a spotter, cones or PCMS added to condition “A” devices would be typical considerations.

**C** – Represents the highest impact level and is typified by:

- High traffic speed and volume.
- All applicable traffic control and safety devices should be considered, such as PCMSs, TMAs, and signs.

The short duration work zone condition level does not provide for a complete assessment, but is a valuable tool for balancing duration with other work zone elements. Worker safety cannot be ignored no matter how short the work duration. A common example of this condition is in the interior lane of a high-speed, multi-lane road. Even though the work duration may be very short, mobile or stationary lane closures must be used.

### **3.5 Consideration and Assessment of Traffic Volumes in Work Zones**

Throughout the guidance in the M 54-44, various references are made to traffic volume. These references may be further described as low volume, moderate volume and high volume. Within the context of this document as well as the MUTCD, traffic volume is intended to be a relative term. For example, high volume traffic conditions during rush hour in Seattle are much different than high volume traffic conditions in Colfax, yet both can still be referred to as high volume, given delays and backups.

Your Region Traffic Office can assist with recommendations for work hours in those areas where high volume traffic conditions could cause undesirable backups and delays.

Field crews may need to make on site judgments as to traffic volume conditions. This consideration is very important when performing short duration work, since fewer warning and protective devices may be used. Key information needed to make a judgment of traffic volumes and how work zones affect traffic includes the following:

### 3.5.1 Work Zone Type

- Lane closures obviously have the greatest impact on traffic, since closed lanes represent a significant reduction in roadway capacity. Worker safety is also a high priority since work is being conducted in the normal traffic path.
- Alternating one-way traffic control with flaggers (AFADs or Portable Signals) can also create significant impacts on traffic since half of the useable roadway may be closed.

Given these considerations for work zone type, the following elements allow for a practical assessment of traffic volumes along the lines of the three short duration conditions, “A”, “B”, and “C”, but can also be used for longer duration stationary work and can apply to mobile work operations.

### 3.5.2 Traffic Conditions

- Experience and knowledge of historical traffic conditions and operation on a given section of highway can provide as much value in determining a traffic volume condition as actual traffic volume counts.
  - **\*\*\*BEST PRACTICE\*\*\*** Some Regions have developed “work hour charts” that list the acceptable or preferred work hours for a particular route and MP location. This is particularly useful in higher volume areas where timing of lane closures is critical. The Region Traffic Office can assist in this area.
- Observations of current traffic conditions can be used to determine the volume condition as follows:
  - **Condition “A” low volume.** Worker awareness of traffic is always essential. At this level vehicles approach the work zone somewhat randomly and generally present a minimal conflict potential. Typified by:
    - Significant gaps in traffic flow.
    - Few vehicles visible at any given time.
    - Random platoons of vehicles.
    - Free flow traffic at the posted speed limit.
    - Near unrestricted access to the work area.
    - Lane closures with minimal delay and backups.
    - Safe walking pace conditions across a 2-lane highway or intersection.
    - Rough estimate of traffic volume at less than 5 vehicles per lane per minute\*.

- **Condition “B” moderate volume.** The frequency of vehicles increases and more care and vigilance is required by workers to ensure safe work operations. Typified by:
  - Gaps in traffic are present, but may be more consistent.
  - Vehicles are generally present all the time.
  - Traffic is constant but still flows freely.
  - Generally free flow traffic speed at the posted limit.
  - Lane closure and flagging operations cause delays and backups within acceptable limits.
  - Good work area access but vehicles are usually present.
  - Safe walking pace conditions across a 2-lane highway or intersection exist, but may require waiting for a gap in traffic. A spotter may be used to warn workers of oncoming traffic.
  - Rough estimate of traffic volume at 12 vehicles per lane per minute\*.
- **Condition “C” high volume.** Constant awareness and protective measures for workers are required to ensure safe work operations. Vehicles are constantly present at this level. Traffic volumes may adversely impact work operations and higher levels of warning and protection will probably be needed. Typified by:
  - Minimal gaps in traffic.
  - Constantly present vehicles.
  - Restricted or unstable traffic flow.
  - Reduced traffic speeds, as volume starts to approach road capacity.
  - Unacceptable backups and delays. Additional signing may be needed if traffic backs up past warning signs.
  - Safe work area access is generally accompanied with protective devices (TMAs, buffer vehicles, etc.)
  - A safe walking condition across a 2-lane highway or intersection may not exist.
  - A rough estimate of 20 vehicles per lane per minute\*.

**Traffic conditions need to be monitored throughout the work operation to determine if adjustments are needed to address traffic impacts.** A worst case scenario of stopping work and reopening the roadway to traffic may be avoided by planning for the traffic conditions in advance and selecting compatible hours of work.

*\*Note:* The values used for traffic volumes (volume per lane per minute) are derived from data that fits the *general description* of the given condition, “A”, “B” or “C”. These are average values that can be used as an indicator or a comparison tool to judge traffic conditions, and may not fit a *specific* location or condition. The Region Traffic Office can assist with specific work hours or provide a closer correlation of the condition values for a given location.

### 3.6 Very Short Duration Work Zones

The overall guidance of the short duration work zone section of this guidebook applies to work zones that may last up to 60 minutes. However, it is important to recognize that many work operations may take only a few seconds or minutes to perform. These actions might be:

- Debris retrieval, locating drainage structures or other roadway features or components.
- Retrieval of lost cargo, work zone sign, or device installation and removal.
- Crash debris retrieval, a survey “shot,” monument or other reference check.
- Crossing or walking along the roadway, motorist assistance.
- Quick repairs intended as a partial or temporary response to damage or failure.

In many cases it is necessary and allowable for workers to walk on a roadway shoulder, cross traffic lanes, or momentarily step into a lane to access work locations or to perform work. These actions can only be accomplished if they are not in conflict with traffic or other hazards and it is safe to do so. See the applicable rules of this section for worker safety and protection.

Very short duration work is typified by the following:

- The primary intent is not to conduct an actual work operation in total, but more related to gathering information, accessing a location, or a non-repetitive action as described above.
- Generally these actions occur at isolated locations or the locations are spaced far enough apart that they would constitute separate work zones.
- Equipment is usually not required, other than the possibility of simple hand tools.
- Stop-gap measures to respond to damage or failures until a permanent repair can be made.

Because of the very short duration and nature of these actions, there is a possibility that adequate work zone measures may not be fully considered. Even though these are very short duration actions, the key work zone elements must still be considered. High worker exposure locations such as in a live

lane and undesirable traffic conditions would still dictate the decision as to the appropriate work zone. It may be acceptable to perform some very short duration actions under work zone condition “A” and “B,” with the minimum required equipment and devices. In most cases this would be a strategically placed work vehicle with warning beacon and personal protective equipment. It is recommended to apply more work zone safety measures if the level of safety can be raised without adding to worker exposure time. Working in teams of two, where one worker can act as a spotter from a safe location, may be a good example of an additional safety measure. The workers ability to maintain awareness of traffic conditions and potential hazards is a key concern.

Normally, specific TCPs are not required for these very short actions since the typical example TCPs for very short duration work zones can cover a wide variety of applications.

**It is required to provide advance warning to traffic approaching very short duration work zones on freeways and high speed multi-lane highways as shown on TCP 19A when working in a live lane with a spotter or using a very short duration lane closure.**

### 3.7 Short Duration Work Zone Rules

1. **Live traffic areas (lanes and intersections) in high speed and high volume work locations may not be good candidates for short duration work zones.** Work zone condition “C” would apply to most of these type of locations and may be acceptable based on a positive site assessment and working only on the shoulder or adjacent lane as follows:
  - **No unprotected work in interior lanes of multi-lane roads and no “island” work areas are allowed.**
  - **Lanes of multi-lane roads may only be accessed from the adjacent shoulder** (see TCP 19).
  - **Intersections may be accessed following the same manner and consideration should be given to incorporating the existing intersection control into the work zone traffic control . . . all red signal control or all way stop control may supplement the selected traffic control measures** (see TCPs 27 and 28).
2. **Short duration flagging operations are not allowed.** All flagging requirements must be complied with and there currently is no exception for short duration work. Emergencies are the only exception to full flagging requirements. Flagging is defined by the MUTCD as stopping, directing or alerting road users.

3. **A determination of a safe work location must be made.** A basic determination can be made by observing traffic conditions (speed, volume, location, visibility, etc.) and assessing the following conditions:
  - Is the work location out of the traffic path?
  - Is there sufficient time for a worker to safely walk (not run) to and return from the work location?
  - Are there other hazards at the location that could affect worker safety?
  - Is there an effective contingency or escape plan?
  - Is there adequate sight distance from the work location to approaching traffic (see TCP 26)?

### 3.8 Short Duration Don'ts and Dos

#### Don't –

- Take “short cuts” or hurry to accomplish work. Determination of all work zone hazards is a must.
- Run across or “dodge” traffic in live lanes.
- Work in a live lane under adverse traffic conditions or without proper traffic control in place . . . even if it is only for a few minutes or a few seconds.
- Assume that shoulder areas are automatically safe. Distracted, aggressive or impaired drivers may encroach. Also, oversize loads may present a hazard.
- Turn your back to oncoming traffic if possible.
- Put yourself in an unexpected location that may surprise a driver.

#### Do –

- Use the work vehicle as protection and warning whenever possible.
- Take advantage of any resources providing protection and warning without causing additional exposure. (TMAs, buffer/shadow vehicles, PCMSs, etc.)
- Plan ahead. Poor planning is not a valid excuse for lack of equipment, devices or awareness of traffic conditions.
- Find the safest available location to park or unload equipment.
- Avoid high traffic volume hours and locations. Plan ahead for better traffic conditions or consider alternate work operations.
- Work on the same side of the road as the work vehicle and warning beacon whenever possible.

### 3.9 Short Duration and Very Short Duration TCPs

The following typical TCPs are a generic pictorial representation of common roadway locations where various work operations are conducted. Depicted on the TCPs are work zone safety and traffic control applications for use with the intended work operations. Typical TCPs are not drawn to scale, but show devices, equipment and data that are intended to be applied in the correct combination along with proper judgment to be safe and comply with approved standards.

**TCP 14 – *Typical Short Duration Lane Closure (Two-Lane, Two-Way Highway Application)***

(This plan depicts typical work zone scenarios that may occur within a lane of a two-lane highway such as a small pavement repair area where it is necessary for workers and/or equipment to occupy a lane for the entire time it takes to make the repair (up to 60 minutes). This could also include narrow shoulder work where workers and equipment must occupy the lane to allow work access to the shoulder.)

**TCP 15 – *Typical Short Duration Lane Closure (Multi-lane Freeway and Highway Application)***

(This plan depicts typical work zone scenarios that may occur in the left or right lane of a multi-lane highway. Center-lane or island type work zones with live traffic on both sides of the work zone are not allowed with this operation; consider a rolling slow down, stationary lane closure or mobile lane closure if these work areas are necessary. As with TCP 14, a small pavement repair may be a typical work operation that occupies the lane for the entire time it takes to make the repair (up to 60 minutes). This could also include narrow shoulder work where workers and equipment must occupy the lane to allow access to the shoulder.)

**TCP 16 – *Typical Short Duration Shoulder Work (Multi-lane Application)***

(This plan depicts typical work zone scenarios that may occur on the left or right shoulder of a multi-lane highway but does not encroach into the lane. The work operation could be related to the roadway shoulder or roadway features such as electrical systems or signs and drainage. Encroachment into the adjacent live lane or the vertical clearance above the live lane is not allowed with this plan. Consider the use of stationary shoulder or lane closure plans if encroachment is necessary.)

**TCP 17 – Typical Short Duration Work Operation (Intersection Application)**

(This plan depicts typical work zone scenarios that may occur at various “in lane” locations of a common intersection with turn pockets. Work operations could be related to pavement markings, traffic signals or other repair or maintenance activities. Intersections that have traffic signals and a possible need for flaggers should be considered when planning the work and could require a stationary plan.)

**TCP 18 – Typical Very Short Duration Work Operation (Outside Traveled Way) (Two-lane or Multi-lane Highways)**

(This plan depicts typical work zone scenarios that may occur at various locations outside of live lanes and other live traffic areas such as merge areas and ramp lanes. These “non-traffic” areas outside of the traveled way are very common locations to park a work vehicle to gain access to a location for very short duration work such as inspection, survey shot, field recon, etc. Under conditions “A” or “B” it is acceptable to walk across lane(s) as can be done safely to access a specific location. It is preferable to park the work vehicle on the same side of the roadway.)

**TCP 19 – Typical Very Short Duration Work Operation (Multi-lane Application, Low Speed, 40 mph or Lower)**

(This plan depicts typical work zone scenarios that may occur at various lane and shoulder locations along a low speed multilane highway for work operations such as; minor pothole repair or other very short duration work that does not actually close or block the lane. As vehicles approach it is incumbent upon the worker to move back to the adjacent shoulder. More than two or three attempts to complete the work may indicate the need for a short duration or stationary work zone TCP.)

**TCP 19a – Typical Very Short Duration In-lane Work (Multi-lane Freeway and Highway Application, High Speed, 45 mph or Higher)**

(This plan depicts two typical very short duration work zone scenarios that may occur in live high speed traffic lanes. Work operations may include minor pothole or debris removal that may be accomplished without presenting an unacceptable hazard to the worker or traffic. By allowing approaching traffic to pass through the work location using the spotter method to alert the worker to move back to the shoulder as traffic approaches. Work that cannot allow traffic to pass through the work location will need to use the lane closed method or consider a short duration or stationary lane closure.)

**TCP 20 – Typical Very Short Duration Lane Closure (Two-Lane Highway)**

(This plan depicts two typical very short duration work zone scenarios that may occur in live traffic lanes on either a low or high speed roadway. Work operations such as a minor pothole or debris removal that may be accomplished without presenting an unacceptable hazard to the worker or traffic. By allowing approaching traffic to pass through the work location using the spotter method to alert the worker to move back to the shoulder as traffic approaches. Work that cannot allow traffic to pass through the work location will need to use the lane closed method or consider a short duration or stationary lane closure.)

**TCP 21 – Typical Very Short Duration Work Operation (Intersection Application)**

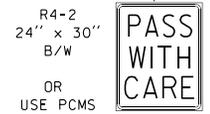
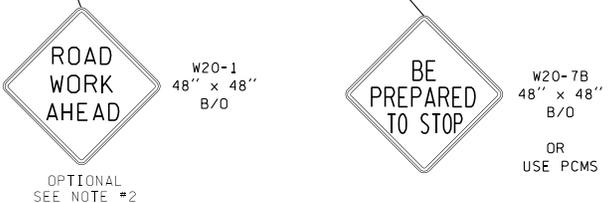
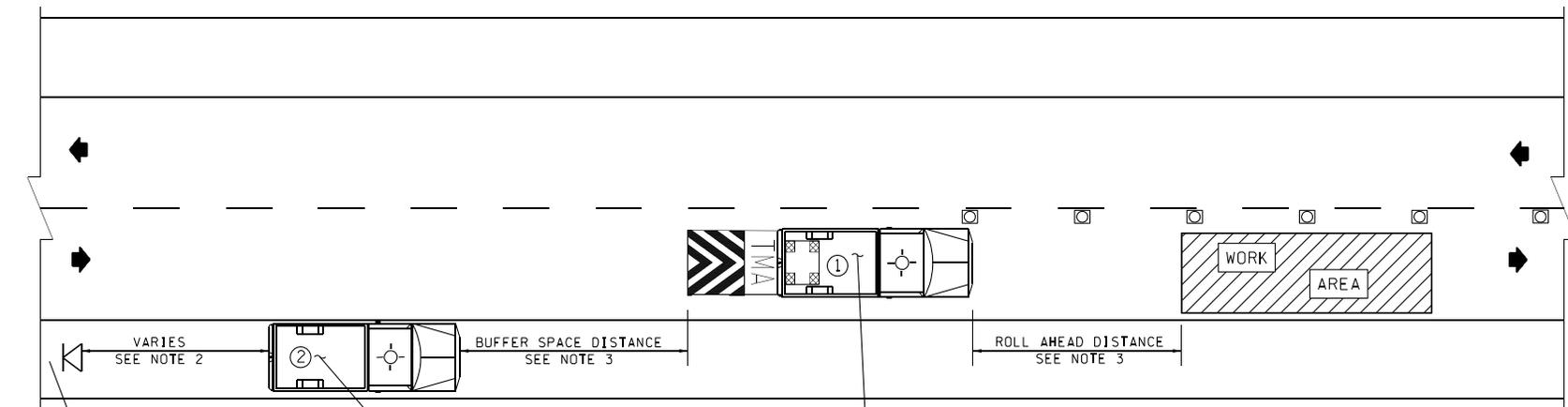
(This plan depicts typical work zone scenarios that may occur in intersections such as; very short field recon to verify field data, take a survey shot, inspect for damage, observation, etc. See TCP 17 for short duration applications.)

WORK ZONE CONDITION (SEE CONDITION GUIDANCE)

- A - ALLOWED, VEHICLE #1 REQUIRED, ALL OTHER DEVICES OPTIONAL.
- B - ALLOWED, VEHICLE #1 AND #2 REQUIRED, CONSIDER USE OF SPOTTER, DEVICES AND LOW VOLUME WORK HOURS.
- C - NOT RECOMMENDED CONSIDER MOBILE OR STATIONARY TCP'S.

NOTES:

1. STOPPING TRAFFIC FOR UP TO 20 MINUTES MAY ALSO BE ALLOWED.  
 (CONTACT & COORDINATE WITH REGION TRAFFIC OFFICE)
2. RESTRICTED SIGHT DISTANCE REQUIRES ADDITIONAL ADVANCE WARNING DEVICES OR SIGNS, SEE TCD 14 FOR SIGHT DISTANCE CHART.
3. REFER TO TAPER AND BUFFER SPACE DETAILS SHOWN ON APPENDIX 3-3 FOR ADDITIONAL INFORMATION.



LEGEND

- WARNING BEACON - REQUIRED
- SIGN LOCATION - TRIPOD MOUNT
- CHANNELIZING DEVICE
- TRUCK MOUNTED ATTENUATOR (RECOMMENDED) (PCMS OPTIONAL)
- PROTECTIVE VEHICLE - REQUIRED
- ADVANCE WARNING VEHICLE
- ARROW PANEL - CAUTION MODE (RECOMMENDED)

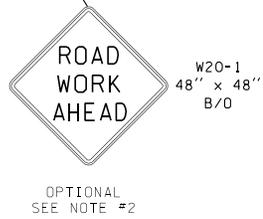
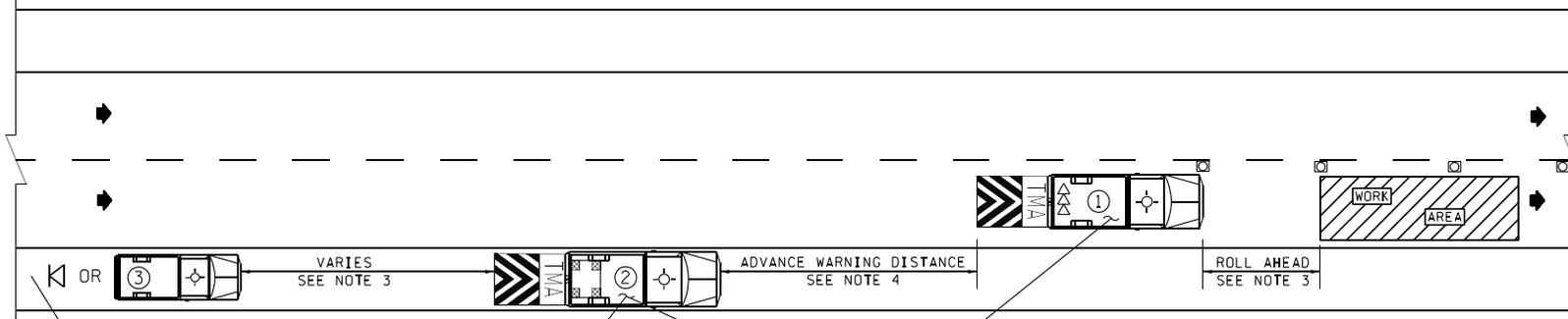
TYPICAL SHORT DURATION LANE CLOSURE  
 2 LANE OPERATION  
 TCP 14

WORK ZONE CONDITION (SEE CONDITION GUIDANCE)

- A - ALLOWED, VEHICLE #1 REQUIRED, ALL OTHER DEVICES OPTIONAL.
- B - ALLOWED, VEHICLE #1 AND #2 REQUIRED, CONSIDER USE OF SPOTTER, DEVICES.
- C - NOT RECOMMENDED, CONSIDER MOBILE OR STATIONARY TCP'S.

NOTES:

1. VEHICLE #3 MAY BE NEEDED BASED ON TRAFFIC VOLUMES.
2. RESTRICTED SIGHT DISTANCE REQUIRES ADDITIONAL ADVANCE WARNING DEVICES OR SIGNS, SEE TCD 14 FOR SIGHT DISTANCE CHART.
3. REFER TO TAPER AND BUFFER SPACE DETAILS SHOWN ON APPENDIX 3-3 FOR ADDITIONAL INFORMATION.
4. USE DISTANCE FROM TAPER LENGTH CHART SHOWN ON APPENDIX 3-3.



PCMS	
1	2
LANE CLOSED	MERGE LEFT
1.5 SEC	1.5 SEC

TRUCK MOUNTED PCMS

- LEGEND**
- WARNING BEACON - REQUIRED
  - SIGN LOCATION - TRIPOD MOUNT
  - CHANNELIZING DEVICE
  - TRUCK MOUNTED ATTENUATOR (RECOMMENDED) (PCMS OPTIONAL)
  - PROTECTIVE VEHICLE - REQUIRED
  - PROTECTIVE VEHICLE
  - ADVANCE WARNING VEHICLE
  - ARROW PANEL - REQUIRED
  - ARROW PANEL - CAUTION MODE (RECOMMENDED)

TYPICAL SHORT DURATION LANE CLOSURE  
MULTI-LANE OPERATION  
TCP 15

WORK ZONE CONDITION (SEE CONDITION GUIDANCE)

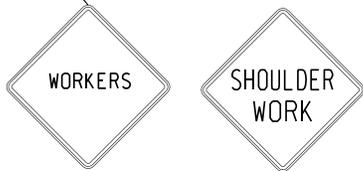
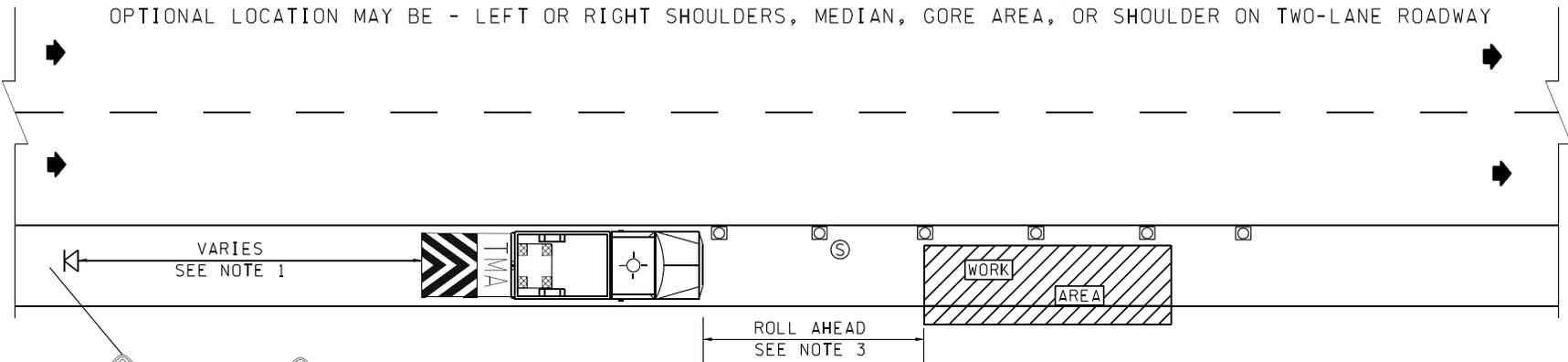
- A - ALLOWED - CONSIDER USING A SPOTTER
- B - ALLOWED - SPOTTER AND/OR CHANNELIZING DEVICES RECOMMENDED, CONSIDER TMA AND/OR PCMS/ARROW CAUTION MODE.
- C - ALLOWED - SPOTTER, CHANNELIZATION DEVICES AND PCMS/ARROW RECOMMENDED, CONSIDER TMA.

NOTES:

1. RESTRICTED SIGHT DISTANCE REQUIRES ADDITIONAL ADVANCE WARNING DEVICES OR SIGNS, SEE TCD 14 FOR SIGHT DISTANCE CHART.
2. NARROW SHOULDERS THAT DO NOT PROVIDE FOR WORK OPERATIONS WITHOUT LANE ENCROACHMENT - 10' LANE MINIMUM, REQUIRES LANE CLOSURE, USE TCP 14 OR 15.
3. REFER TO TAPER AND BUFFER SPACE DETAILS SHOWN ON APPENDIX 3-3 FOR ADDITIONAL INFORMATION.

\*\* ROADWAY EXAMPLE REPRESENTS TYPICAL LOCATION.

OPTIONAL LOCATION MAY BE - LEFT OR RIGHT SHOULDERS, MEDIAN, GORE AREA, OR SHOULDER ON TWO-LANE ROADWAY



W21-1  
 48" x 48" OR W21-5  
 48" x 48"  
 B/O B/O  
 OR OTHER APPROPRIATE  
 ADVANCE WARNING SIGN  
 OR PCMS  
 (OPTIONAL SEE NOTE 1)

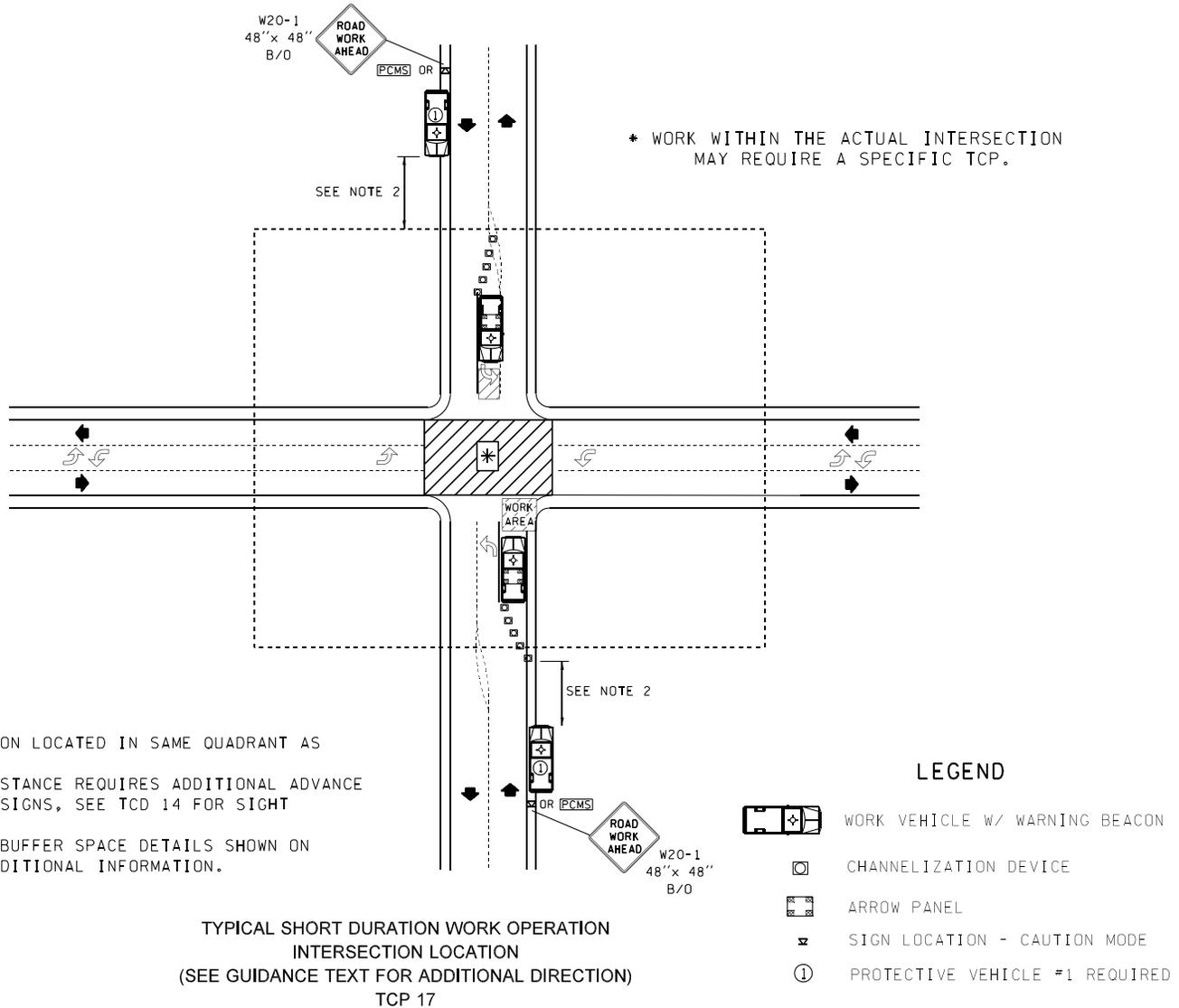
TYPICAL SHORT DURATION SHOULDER WORK  
 MULTI-LANE OPERATION  
 TCP 16

LEGEND

- WORK VEHICLE W/ WARNING BEACON
- SIGN LOCATION - (SEE NOTE 1)
- CHANNELIZING DEVICE
- SPOTTER
- ARROW PANEL - TYPE "B"  
(CAUTION MODE)
- TRUCK MOUNTED ATTENUATOR  
(RECOMMENDED)

WORK ZONE CONDITION (SEE CONDITION GUIDANCE)

- A - ALLOWED - CONSIDER USING A SPOTTER, WORK VEHICLE REQUIRED.
- B - ALLOWED - SPOTTER AND/OR CHANNELIZING DEVICES RECOMMENDED, CONSIDER TMA AND/OR PCMS/ARROW CAUTION MODE.
- C - ALLOWED - CHANNELIZATION DEVICES AND PCMS/ARROW (CAUTION MODE), TMA, SPOTTER RECOMMENDED, VEHICLE #1 REQUIRED.

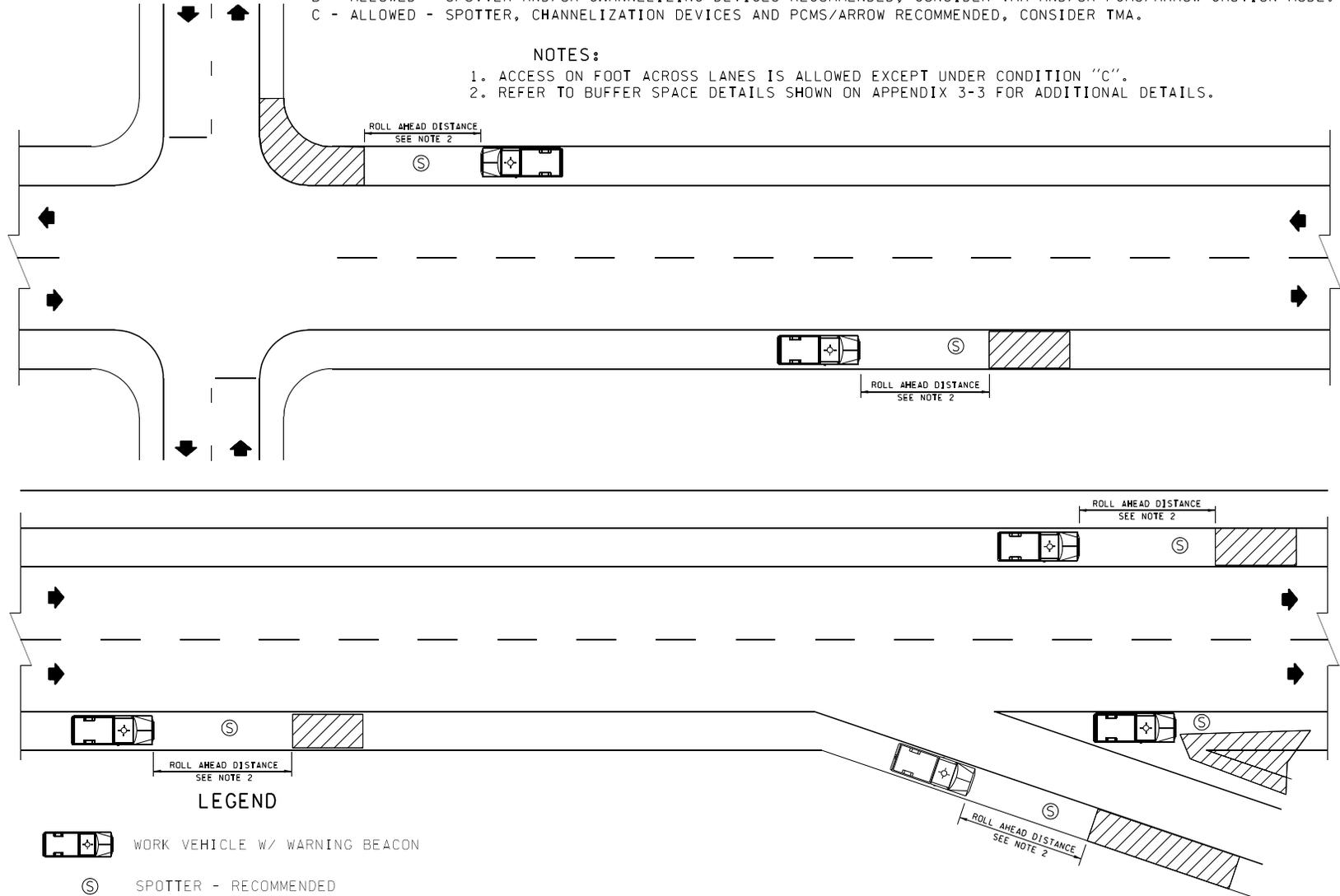


WORK ZONE CONDITION (SEE CONDITION GUIDANCE)

- A - ALLOWED - CONSIDER USING A SPOTTER
- B - ALLOWED - SPOTTER AND/OR CHANNELIZING DEVICES RECOMMENDED, CONSIDER TMA AND/OR PCMS/ARROW CAUTION MODE.
- C - ALLOWED - SPOTTER, CHANNELIZATION DEVICES AND PCMS/ARROW RECOMMENDED, CONSIDER TMA.

NOTES:

1. ACCESS ON FOOT ACROSS LANES IS ALLOWED EXCEPT UNDER CONDITION "C".
2. REFER TO BUFFER SPACE DETAILS SHOWN ON APPENDIX 3-3 FOR ADDITIONAL DETAILS.



ROLL AHEAD DISTANCE  
SEE NOTE 2

LEGEND

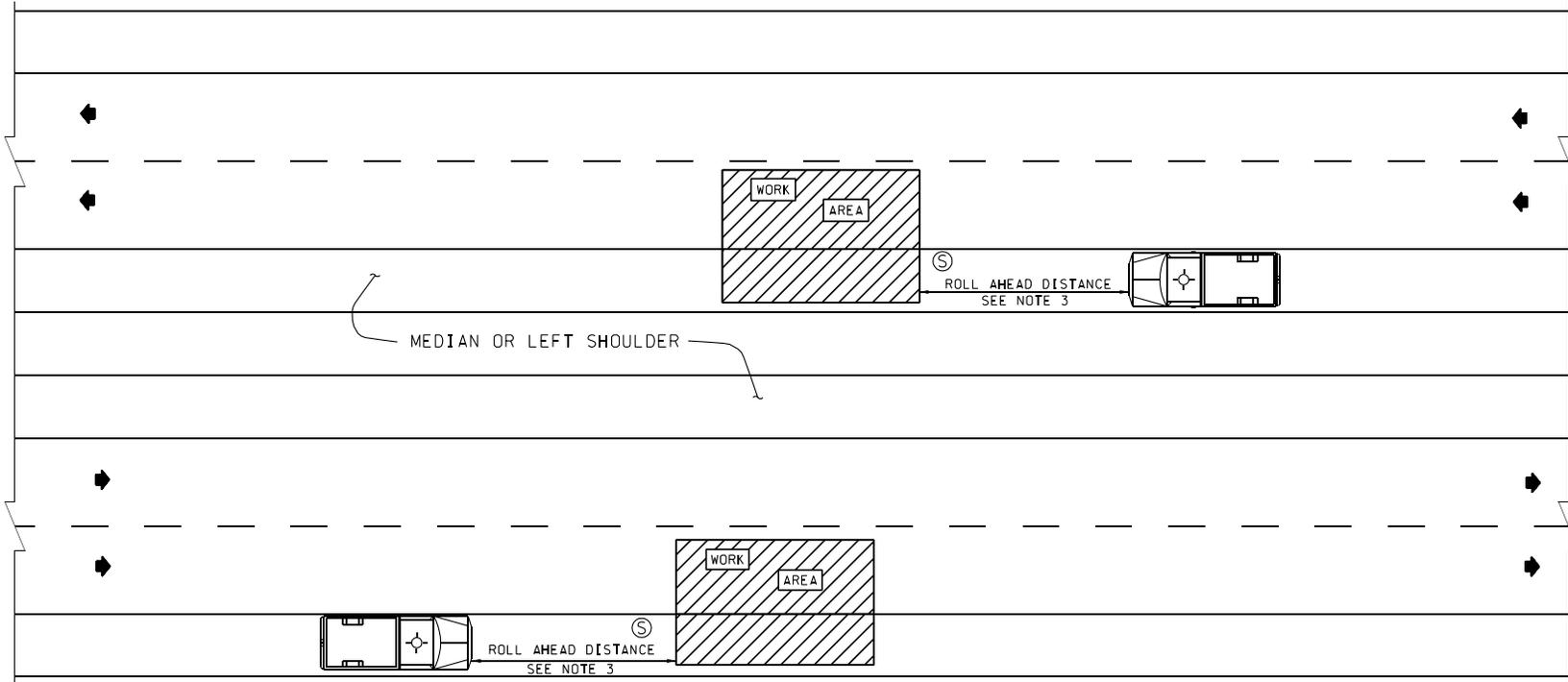
-  WORK VEHICLE W/ WARNING BEACON
-  SPOTTER - RECOMMENDED
-  WORK AREA

TYPICAL VERY SHORT DURATION WORK OPERATION (OUTSIDE TRAVELED WAY)  
(HIGH OR LOW SPEED SHOULDER WORK, MEDIAN, GORE, RAMP SHOULDER, ETC.)

TCP 18

WORK ZONE CONDITION (SEE CONDITION GUIDANCE)

- A - ALLOWED - CONSIDER USING A SPOTTER
- B - ALLOWED - SPOTTER REQUIRED FOR WORKER ACCESS TO LANE.
- C - NOT RECOMMENDED, SEE TCP 19a FOR WORK ZONE REQUIREMENTS.



NOTES:

1. SEE GUIDANCE SECTION FOR WORKER(S) IN LANE
2. RESTRICTED SIGHT DISTANCE REQUIRES ADDITIONAL ADVANCE WARNING DEVICES OR SIGNS, SEE TCD 14 FOR SIGHT DISTANCE CHART.
3. REFER TO TAPER AND BUFFER SPACE DETAILS SHOWN ON APPENDIX 3-3 FOR ADDITIONAL INFORMATION.

LEGEND



PROTECTIVE / WORK VEHICLE WITH WARNING BEACON



SPOTTER

TYPICAL VERY SHORT DURATION WORK OPERATION - LOW SPEED (40 MPH OR LESS)  
(SEE GUIDANCE TEXT FOR ADDITIONAL DIRECTION)

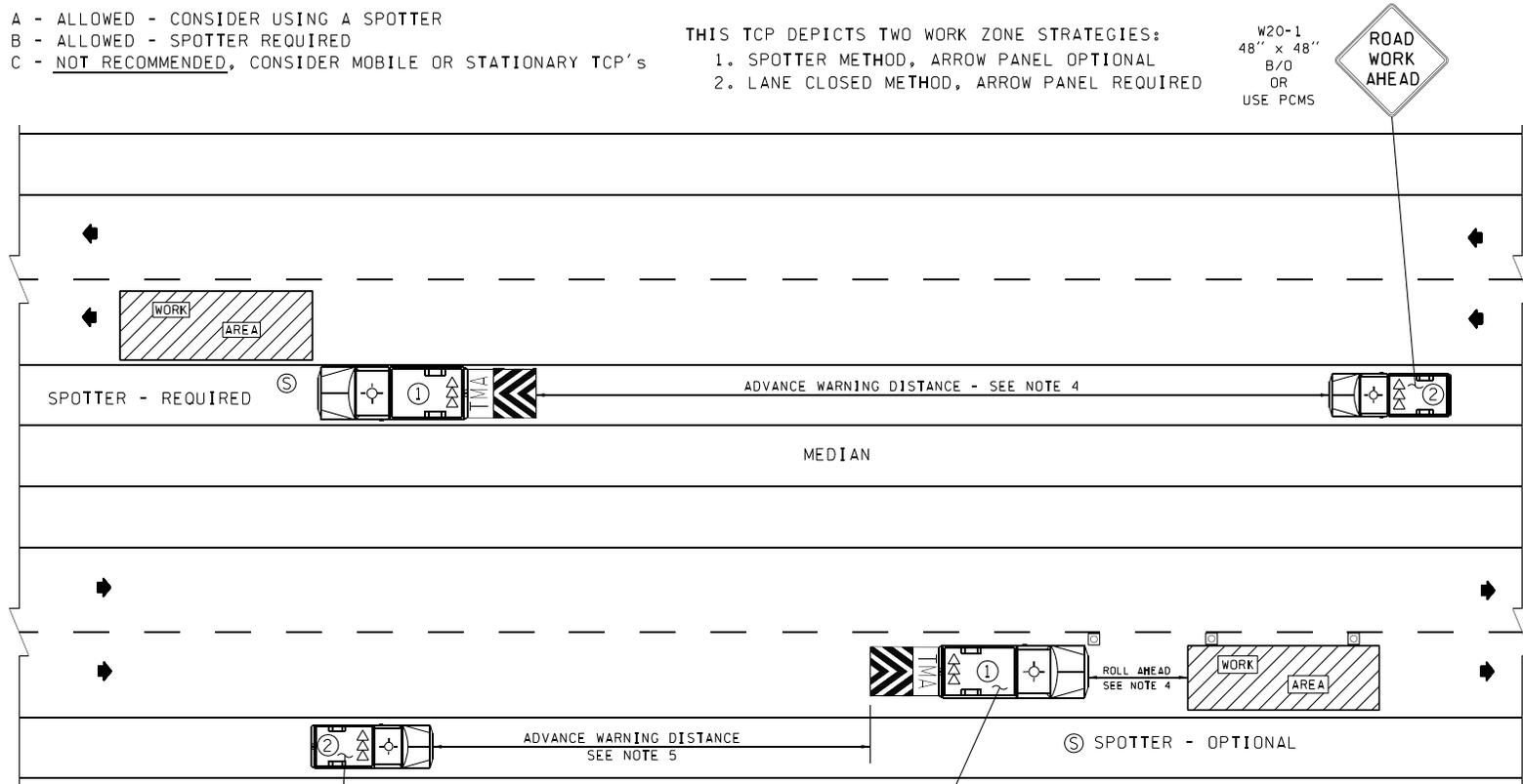
TCP 19

WORK ZONE CONDITION (SEE CONDITION GUIDANCE)

- A - ALLOWED - CONSIDER USING A SPOTTER
- B - ALLOWED - SPOTTER REQUIRED
- C - NOT RECOMMENDED, CONSIDER MOBILE OR STATIONARY TCP'S

THIS TCP DEPICTS TWO WORK ZONE STRATEGIES:  
 1. SPOTTER METHOD, ARROW PANEL OPTIONAL  
 2. LANE CLOSED METHOD, ARROW PANEL REQUIRED

W20-1  
 48" x 48"  
 B/O  
 OR  
 USE PCMS



PCMS	
1	2
LANE CLOSED	MERGE LEFT
1.5 SEC	1.5 SEC

TRUCK MOUNTED PCMS (OPTIONAL)



PCMS	
1	2
LANE CLOSED	MERGE LEFT
1.5 SEC	1.5 SEC

TRUCK MOUNTED PCMS (OPTIONAL)

LEGEND

- ⊕ WARNING BEACON - REQUIRED
- ① PROTECTIVE / WORK VEHICLE - REQUIRED
- ② ADVANCE WARNING VEHICLE OR SIGN - REQUIRED
- TMA TRUCK MOUNTED ATTENUATOR (RECOMMENDED) (PCMS OPTIONAL)
- ⇨⇨ ARROW PANEL - SEE NOTES
- CHANNELIZING DEVICE - OPTIONAL

NOTES:

1. FOR LOCATIONS WITH 3 OR MORE LANES, INTERIOR LANE MUST BE CLOSED WITH EITHER A ROLLING SLOWDOWN OPERATION, MOBILE OR STATIONARY LANE CLOSURES.
2. SHOULDER WIDTH MUST ALLOW VEHICLE ACCESS.
3. SPOTTER IS OPTIONAL FOR LANE CLOSURE METHOD. SEE CONDITION NOTES
4. USE DISTANCES SHOWN ON BUFFER DATA CHART APPENDIX 3-3.
5. USE DISTANCE FROM TAPER LENGTH CHART SHOWN ON APPENDIX 3-3.

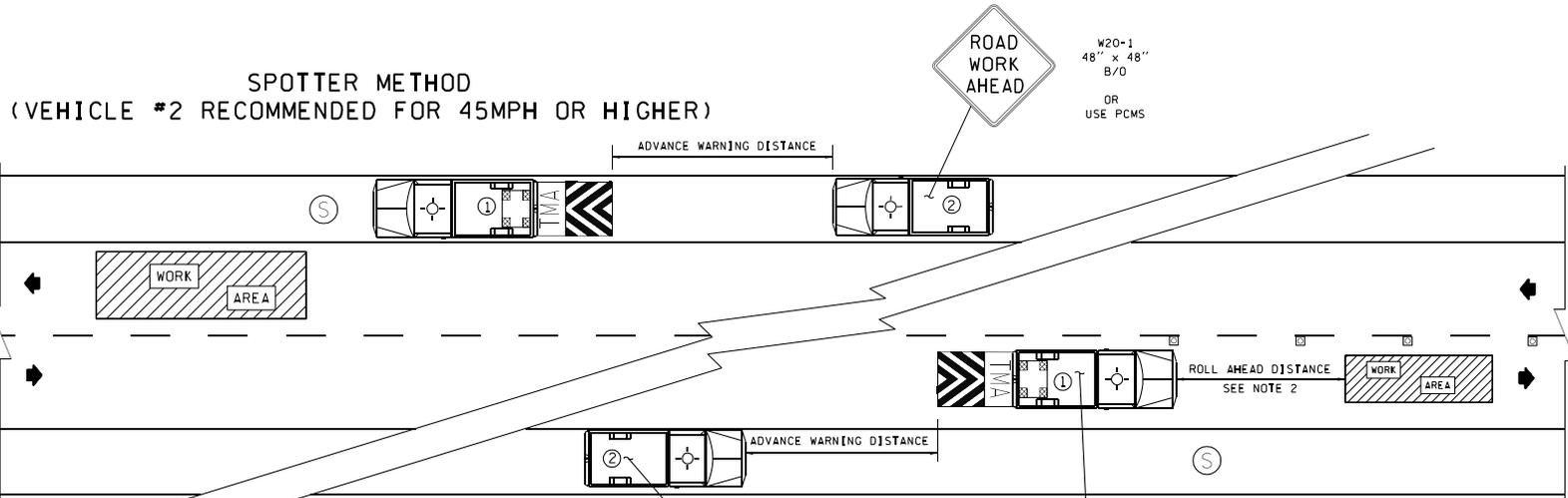
TYPICAL VERY SHORT DURATION IN-LANE WORK  
 FREEWAY AND MULTI-LANE OPERATION - HIGH SPEED (45 MPH OR HIGHER)  
 TCP 19a

WORK ZONE CONDITION (SEE CONDITION GUIDANCE)

- A - ALLOWED, VEHICLE #1 REQUIRED. (SEE METHOD NOTES FOR INFORMATION ON VEHICLE #2 AND SPOTTER USE)
- B - ALLOWED, VEHICLE #1 REQUIRED. (SEE METHOD NOTES FOR INFORMATION ON VEHICLE #2 AND SPOTTER USE)
- C - NOT RECOMMENDED, CONSIDER MOBILE OR STATIONARY TCP'S.

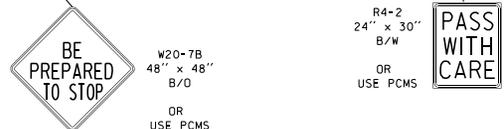
NOTES:

1. STOPPING TRAFFIC FOR UP TO 5 MINUTES MAY ALSO BE ALLOWED. (CONTACT & COORDINATE WITH REGION TRAFFIC OFFICE)
2. REFER TO TAPER AND BUFFER SPACE DETAILS SHOWN ON APPENDIX 3-3 FOR ADDITIONAL INFORMATION.



LEGEND

- ⊕ WARNING BEACON - REQUIRED
- TRUCK MOUNTED ATTENUATOR (RECOMMENDED) (PCMS OPTIONAL)
- ① PROTECTIVE VEHICLE - REQUIRED
- ② ADVANCE WARNING VEHICLE - SEE METHOD NOTES
- ARROW PANEL - CAUTION MODE (RECOMMENDED)
- Ⓢ SPOTTER
- ⊞ CHANNELIZATION DEVICE - OPTIONAL

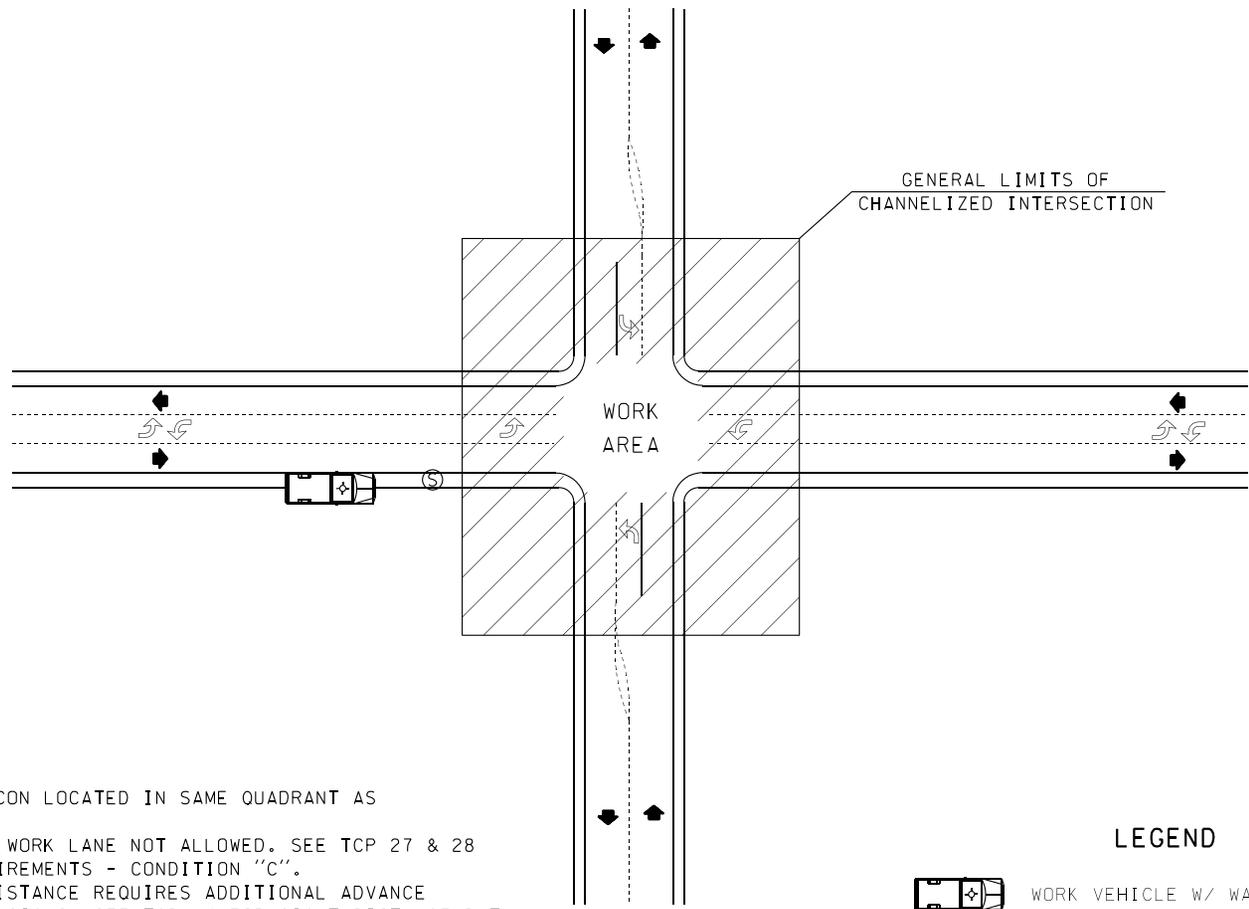


LANE CLOSURE METHOD (VEHICLE #2 ALWAYS REQUIRED, SPOTTER OPTIONAL)

TYPICAL VERY SHORT DURATION LANE CLOSURE  
2 LANE HIGHWAY OPERATION  
TCP 20

WORK ZONE CONDITION (SEE CONDITION GUIDANCE)

- A - ALLOWED - CONSIDER USING A SPOTTER.
- B - ALLOWED - SPOTTER RECOMMENDED CONSIDER ADDITIONAL WARNING SIGNS.
- C - NOT ALLOWED - SEE TCP 27 & 28 FOR WORK ZONE REQUIREMENTS.



NOTES:

1. WORK VEHICLE W/BEACON LOCATED IN SAME QUADRANT AS WORK LOCATION.
2. REPEATED ACCESS TO WORK LANE NOT ALLOWED. SEE TCP 27 & 28 FOR WORK ZONE REQUIREMENTS - CONDITION "C".
3. RESTRICTED SIGHT DISTANCE REQUIRES ADDITIONAL ADVANCE WARNING DEVICES OR SIGNS, SEE TCD 14 FOR SIGHT DISTANCE DATA.
4. RECOMMEND WORKING DURING RED PHASE IF SIGNALIZED.
5. REFER TO TAPER AND BUFFER SPACE DETAILS SHOWN ON APPENDIX 3-3 FOR ADDITIONAL INFORMATION.

LEGEND

-  WORK VEHICLE W/ WARNING BEACON
-  SPOTTER

TYPICAL VERY SHORT DURATION WORK OPERATION  
 INTERSECTION LOCATION  
 (SEE GUIDANCE TEXT FOR ADDITIONAL DIRECTION)  
 TCP 21

