TEMPORARY TRAFFIC CONTROL

FLAGGING OPERATIONS MANUAL

MAY 2024

M 3146

EVERGREEN SAFETY COUNCIL

Washington State Department of Transportation

V 1.1

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Introduction

- This book was created to be used for training the flagger to work safely and to protect the safety of others.
- Flaggers are a vital role in the successful operations of all maintenance, construction, and utility projects. Flaggers shall need to know the information within this book well enough that it becomes second nature.
- Flaggers are required when all other methods of traffic control are not enough to control the situation, and the impacts of the temporary traffic control zone.
- Your fellow workers and the road users depend on your ability to stay alert while controlling traffic using your visual movements along with your “Stop/Slow” paddle.
- As a flagger the actions you take reflect on yourself as well as your employer. You are often the initial point of contact the traveling public will have with the work zone.
- While performing your flagging duties you shall be efficient, responsible, and conducting yourself in a safe and professional manner at all times.

Youth Employment Prohibited Duties

- Some jobs are hazardous for young workers. Washington State and federal laws prohibit many jobs and duties for minor workers.
- Prohibited duties vary depending on the worker’s age and the job duties.
- **Flagging personnel must be 18 years of age to obtain and acquire a Washington State Traffic Control Flagger Card.**

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How It Works

Functions and responsibilities of a professional trained flagger include:

- Guiding all road users safely through the work area.
- Protecting workers lives by recognizing dangerous traffic situations, and warning the crew within the area should a hazard present itself.
- Avoid inhibiting the traveling public as much as possible.
- Giving clear concise directions to road users.
- Allowing for adequate distance for road users to recognize signs, signals, and to come to a complete stop.
- Utilizing approved safety equipment to remain highly visible to traffic during the day or night-time conditions.
- Meeting all Federal, State, and Local requirements.

Upon successful completion of an approved training course and passing an exam with a score of 80% or higher, you will receive a certification card. This certification card will be valid for three years from the date of the course.

A Washington State Traffic Control Flagger Card must be kept on your person when performing any flagging duties. Flagging cards issued in Washington State are accepted in Oregon, Montana, and Idaho. Flagging cards from Oregon, Montana, and Idaho are also accepted in Washington State.

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Chapter One:

Federal, State, and Local requirements

1.1 Federal Requirements

The 2009 Edition of the *Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)*, published by the Federal Highway Administration and approved by the Federal Highway Administrator as the national standard for all public roadways, was duly adopted by the Washington state secretary of transportation.

Part 6 of the MUTCD covers temporary traffic control with **Part 6E** specifically covering flagger control.

The level of compliance when applying the principles in the MUTCD is as follows:

- **Standard:** "shall" conditions
- *Guidance: "should" conditions (should have a good reason not to follow)*
- Option: "may" conditions
- Support: descriptive and/or general information

Important:

- Employers are required to **evaluate and consider** Guidance statements and implement them when engineering judgement or study indicates they are appropriate per WISHA Regional Directive 27.20 for traffic control and flagging.
- Employers can be cited by Labor & Industries for failure to implement Guidance statements if they do not explain how it was evaluated and why it was not implemented. Simply stating "Guidance is not mandatory" is not sufficient.

1.2 Washington State Modifications to the MUTCD

As part of the Washington State Department of Transportation (WSDOT) adoption of the 2009 MUTCD per Washington State Administrative Code 468-95, modifications have been made to Part 6 per WAC 468-95-300 to WAC 468-95-317. These modifications amend or supplement guidance and add new standards to the MUTCD for all public roadways in Washington.

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AMEND SECTION

WAC 468-95-300 Temporary traffic control. Amend MUTCD Table 6C-1 to read:

Sign Spacing (1)

1) All spacing may be adjusted to accommodate interchange ramps, at-grade intersections, and driveways.

2) This spacing may be reduced in urban areas to fit roadway conditions.

NEW SECTION

WAC 468-95-301 Tapers. Add a new MUTCD Table 6C-5, Channelization Device Spacing, to Section 6C.08 to read:

SIGN SPACING		
Freeways and Expressways	55/70 MPH	1500' ±
Rural Highways	60/65 MPH	800' ±
Rural Roads	45/55 MPH	500' ±
Rural Roads and Urban Arterials	35/40 MPH	350' ±
Rural Roads, Urban Arterials, Residential, Business Districts	25/30 MPH	200' ± (2)
Urban Streets	25 MPH or less	100' ± (2)

NEW SECTION

WAC 468-95-3015 Flagger procedures. Add a new Standard to MUTCD Section 6E.07 to read:

CHANNELIZATION DEVICE SPACING (Feet)		
MPH	**TAPER**	**TANGENT**
50/70	**40**	**80**
35/45	**30**	**60**
25/30	**20**	**40**

Standard:

Flagger directions at signalized intersections shall not be in conflict with signal displays and the signal must be either shut down or placed in flash mode as appropriate for the intersection operation except during emergencies.

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NEW SECTION

WAC 468-95-302 Flagger stations. Add a new Standard to MUTCD Section 6E.08 to read:

Standard:

A single flagger shall not flag from the center of an intersection, except when there is an emergency or when law enforcement is flagging. When flagging at an intersection there shall be a flagger controlling each intersection leg.

NEW SECTION

WAC 468-95-305 Motorcycle construction warning sign. Pursuant to RCW 47.36.200, a warning sign displaying the word message MOTORCYCLES USE EXTREME CAUTION is added to MUTCD Figure 6F-4. The sign shall be diamond shaped with black letters on an orange background.

AMEND SECTION

WAC 468-95-306 Motorcycles use extreme caution supplemental plaque. Pursuant to RCW 47.36.200, amend MUTCD Section 6F.54 to read:

A supplemental plaque displaying the message MOTORCYCLES USE EXTREME CAUTION is added to MUTCD Figure 6F-4. Delete the Motorcycle symbol (W8-15P) plaque from Figure 6F-4.

The MOTORCYCLES USE EXTREME CAUTION (W21-1701P) plaque (see Figure 6F-4) may be mounted below a LOOSE GRAVEL (W8-7) sign, a GROOVED PAVEMENT (W8-15) sign, a ABRUPT LANE EDGE (W21-801), a METAL BRIDGE DECK (W8-16) sign, or a STEEL PLATE AHEAD (W8-24) sign if the warning is intended to be directed primarily to motorcyclists.

NEW SECTION

WAC 468-95-307 Abrupt lane edge warning sign. A warning sign displaying the word message ABRUPT LANE EDGE is added to MUTCD Figure 6F-4. The sign shall be diamond shaped with black letters on an orange background.

The sign shall be used where Section 1-07.23(1) of the Washington state department of transportation's standard specifications require warning signs to alert drivers about an elevation differential between lanes or between the outside lane and the shoulder.

1.3 Safety Standards for Construction Work

The Washington State Department of Labor and Industries **WAC 296-155-305** Part E Signaling and Flaggers states the following:

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"You must first apply the requirements in this section. Then you must set up and use temporary traffic controls according to the guidelines and recommendations in Part VI of the MUTCD."

"Flaggers are to be used only when other reasonable traffic control methods will not adequately control traffic in the work zone."

"Position work zone flaggers so they are not exposed to traffic or equipment approaching them from behind."

"Flagger training. You must make sure that:

a. Each flagger has in their possession:

- *A valid Washington traffic control flagger card; or*
- *A valid flagger card from a state such as:*
  - ⇒ *Oregon*
  - ⇒ *Idaho*
  - ⇒ *Montana*

"The employer, responsible contractor or project owner must conduct an orientation that familiarizes the flagger with the job site."

On all flagging operations *"A 4 sign advance warning sequence on all roadways with a 45 mph or higher speed limit."* Is required.

"Flaggers are not assigned other duties while engaged in flagging activities."

See Appendix D for the entire WAC 296-155-305 text.

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1.4 Safety Apparel

At **all times** flaggers shall wear:

- A high-visibility garment that is labeled as meeting **ANSI/ISEA 107-2015** American National Standard for High-Visibility Safety Apparel and Headwear or equivalent revision. Garment Type "R" Performance Class 2 or Class 3. This outer most garment must be worn in a manner to ensure 360 degrees of uninterrupted background and retroreflective material encircling the torso. Background colors shall be either fluorescent yellow-green, fluorescent orange-red or fluorescent red.

- A hard hat with a high-visibility color of white, yellow, yellow-green, orange or red.

- Sturdy work boots.

During hours of darkness (one-half hour before sunset to one-half hour after sunrise) or other low visibility conditions (snow, fog, etc.) High-visibility pants or gaiters labeled as ANSI/ISEA 107-2015 (or equivalent revision) Supplemental Item; Performance Class E shall also be worn. Hard hats must be marked with at least 12 square inches of retro-reflective material applied to provide 360 degrees of visibility.

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The apparel background (outer) material color shall be fluorescent orange-red, fluorescent yellow-green, or a combination of the two as defined in the ANSI/ISEA 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 feet. The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.

High-visibility apparel must be kept clean and in an acceptable condition as defined in the American Traffic Safety Services Association "*Quality Guidelines for Temporary Traffic Control Devices"* and shall be replaced when condition degrades below acceptable condition.

Sunrise and Sunset Calculator (timeanddate.com)

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GARMENT CHECK STATION

NEW OR LIKE NEW GARMENT

- Excellent Color Contrast
- Excellent Reflectivity
- No Fading or Soiling

ACCEPTABLE USED GARMENT

- Excellent Reflectivity
- Limited Fading or Soiling

UNACCEPTABLE GARMENT (Replace if any)

- Poor Color Contrast
- Compromised Reflectivity
- Significant Fading or Soiling

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1.5 Clothing and Other Considerations

Clothing

- Shirts with either long or short sleeves (no sleeveless shirts)
- Garments with hoods that restrict visibility shall not be worn while flagging.
- Long pants in all weather

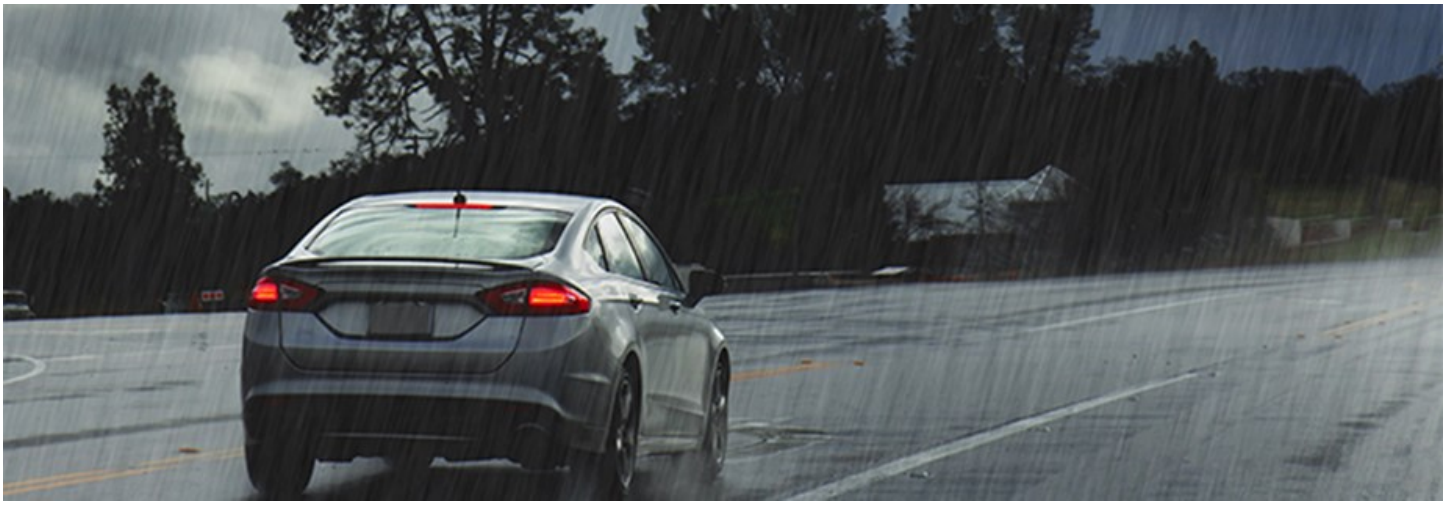
Additional Supplies

- Valid Washington State Traffic Control Flagger Card; or a valid card from Oregon, Idaho, Montana
- Whistle/air Horn
- Flashlight/extra Batteries
- Extra radio batteries
- Extra clothing
- Rain Gear
- Sunscreen
- Bug repellant
- Extra food and water

Weather

- Dress in layers to accommodate weather changes.
- Check weather forecast prior to shift.
- Make sure the weather is not going to impact your ability to complete your flagging responsibilities.

Always conduct inspections on all flagging equipment prior to arriving on the job site (flagging paddles, radios, and signage).



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Chapter Two

Flagger Attributes and Abilities

2.1 Flagger Attributes

Flaggers are the eyes and ears of a construction site, an integral part of the safety for workers and drivers alike. Flaggers are responsible for the safety of road users, workers, and themselves. The best flaggers are those individuals who possess certain attributes as the ones listed below.

- **Awareness** – Routinely working near traffic can lead to workers becoming complacent to the danger around them. Therefore, it is necessary to continually remind ourselves and those around us of the dangers to which everyone is exposed.
- **Communication -** Flaggers can receive and communicate specific instructions clearly, firmly, and courteously.
- **Alertness** – There is no place in the work zone for unnecessary distractions. Every individual must stay constantly alert for the safety of all personnel within the work zone. Flaggers shall not use devices including cell phones, pagers, radios, and headphones while actively engaged in flagging operations.
- **Attitude** – A safety-conscious attitude on the part of each crew member will contribute greatly to the overall safety for all.
- **Responsibility** – It is everyone's responsibility to understand and comply with all safety standards and practices.

2.2 Flagger Abilities

A flagger must be in good physical condition with good hearing as well as vision (with or without the help of glasses or electronic hearing aids). Flaggers need the ability to be mobile enough to maneuver around the flagging station and to escape an errant vehicle if needed during emergency situations.

Flagging requires the ability to stand in a full and upright position while controlling signaling devices providing clear and concise directions to road users while projecting your authority and professionalism as a flagger.

A flagger shall be able to remain calm when dealing with an angry motorist, understand their concerns, be able to explain the reason for the delays, and be able to de-escalate the situation.

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When **not actively flagging**, flaggers may be expected to assist with the placement or removal of temporary traffic control devices establishing the traffic control zone or operate a pilot car.

2.3 Rest Periods

- Flaggers receive a rest period of at least 10 minutes, on the employer's time, for each 4 hours of working time.

- Rest periods must be scheduled as near as possible to the midpoint of the work period.

- A flagger must not be allowed to work more than 3 hours without a rest period.

Exception:

Scheduled rest periods are not required where the nature of the work allows a flagger to take intermittent rest period's equivalent to 10 minutes for each 4 hours worked.

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Chapter Three

Positioning for Safety

3.1 Flagging Station

Flagging stations shall be located such that approaching road users will have sufficient distance to stop at the intended stopping point.

Table 6E-1 of the MUTCD is listed as the vehicle Stopping Sight Distance as a Function of Speed. This table should be referenced when determining the distance that a car will need to stop based on the speed of the road you are working on.

A good practice is to locate a point of reference (cone, tree, mailbox streetlight…) you can see ahead of your station that is at least the appropriate distance from this table. This way you know when approaching road user passes that point, they will have the sight distance required to come to a complete stop.

Table 6E-1 / 6C-2.
Stopping Sight Distance as a Function of Speed

Speed*	Distance
20 MPH	115 feet
25 MPH	155 feet
30 MPH	200 feet
35 MPH	250 feet
40 MPH	305 feet
45 MPH	360 feet
50 MPH	425 feet
55 MPH	495 feet
60 MPH	570 feet
65 MPH	645 feet
70 MPH	730 feet
75 MPH	820 feet

*posted speed, off-peak 85th-percentile speed prior to work starting, or the anticipated stopping speed in mph.

- The flagger shall always be clearly visible to the first approaching road user.
- Stand alone in a conspicuous place on the shoulder of the road.
- Choose a location that provides you with an escape route.
- Stand where there is a sharp color contrast between you, the background, and the equipment. If possible, never stand in the shade.
- When flagging near on a hill or a curve in the road, the flagger station should be installed before the crest of a hill or ahead of a curve.
- Stand in a location that approaching road users and the workspace can be observed.
- The flagger shall be stationed sufficiently in advance of the workspace to warn workers (*with audible warning devices such as horns or whistles*) of approaching danger by out-of-control vehicles.

- A flagger shall only move into a lane after road users have stopped and must return to the shoulder before instructing road users to proceed.

- Do not stand in front of stopped or parked vehicles on the road.

- Directing traffic from an elevated roadway such as a bridge or overpass does not allow for an escape route. While flagging from an elevated roadway is allowed, it is not recommended.

- Remain at your position. Never abandon your flagging station for any reason until you are relieved by your supervisor or a qualified flagger.

- During hours of darkness, flagger stations shall be illuminated by using a portable light plant or balloon type lights. Aim lighting either parallel or perpendicular to the roadway minimize glare for the road user. **When used, floodlights shall not produce a glare to the road user**. The flagger should be visible and discernable as a flagger from 1,000 feet.

- Cover, turn or remove any signs that do not apply when flagger control is no longer active, or when the work is completed for the day.

3.2 Additional Considerations

Additional circumstances such as weather conditions, roadway downgrades, large percentage of trucks, roadway surface conditions etc. should be taken into consideration as they play a critical part in how a vehicle can come to a complete stop.

The stopping distance point that you designate prior to your shift may need to be adjusted due to these circumstances.

It is important to remember the larger the vehicle, the more distance it will need to come to a complete stop.

The stopping distance is intended to be a minimum guideline and will be dependent upon your judgement as conditions change.

3.3 One-Flagger and Multi-Flagger Operations

With a short work area on a straight, low volume road, a single flagger can be utilized to control traffic. The flagger must be visible to traffic coming from both directions and should be positioned on the shoulder directly opposite the work area.

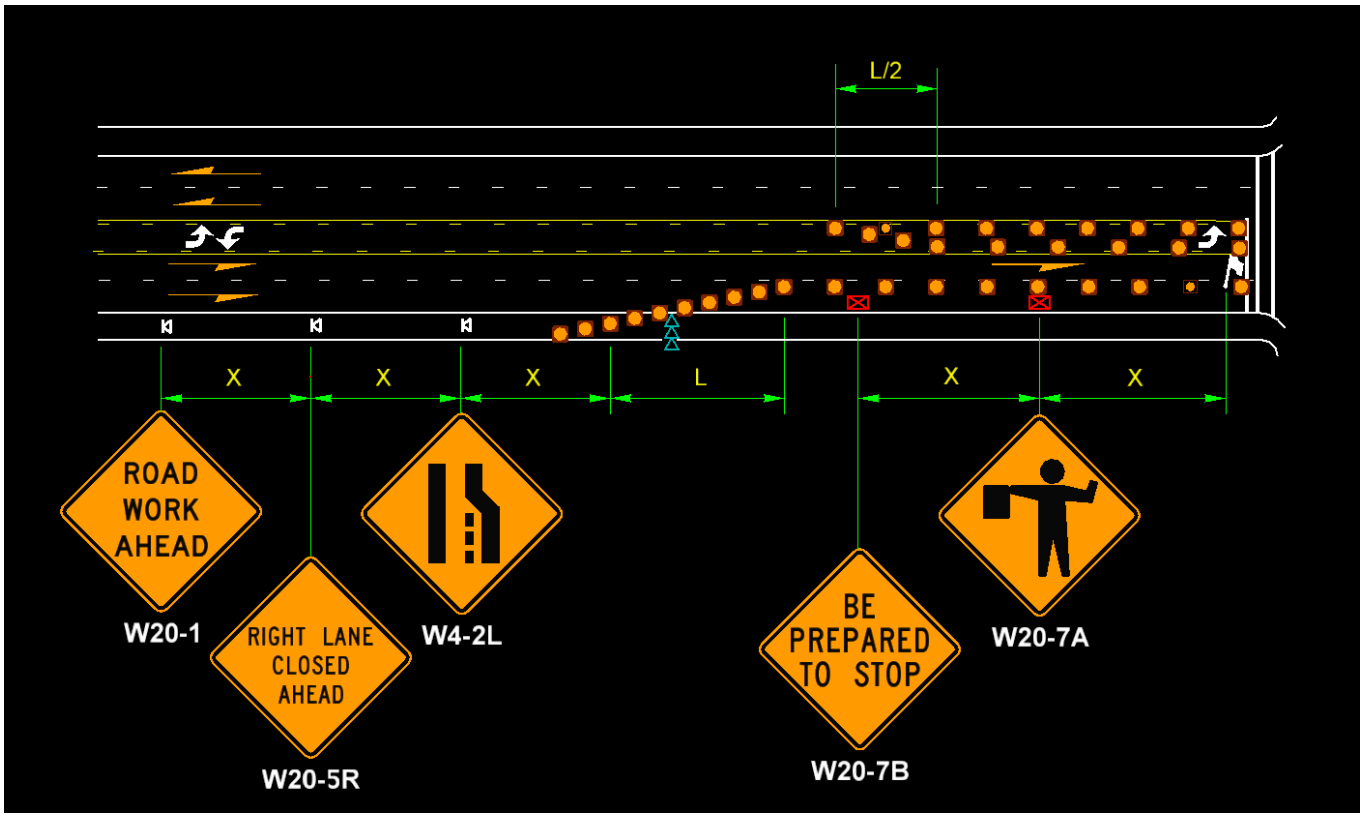
A two-flagger operation uses a flagger positioned at each end of the work zone to control the traffic flow. This is the most common and preferred flagging operation. One flagger should be designated as the lead flagger for coordinating the operation.

When working on roadways with restricted visibility, or when communication devices fail, a third flagger can be added to the operation to provide communication to the two flaggers. This person will assume the position of lead flagger and will be placed in the middle of the operation to provide visibility and communication to the other flaggers.

3.4 Multi-Lane Roadway Flagging Operations

This type of flagging occurs when work vehicles or equipment temporarily need traffic to be stopped in one direction to make a maneuver or to enter/exit the work zone. On multi-lane roads, the lanes shall be closed leaving a single through lane, with the addition of a turn lane if needed. **The flagger will control the single open lane from a flagger station inside of the closure, only stopping traffic as needed.**

This operation is prohibited on freeways and expressways.



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3.5 Mobile Flagging Operations

In a mobile operation when the flagger is moving with the operation, *a flagger ahead sign must be within 1,500 feet of the flagger* and the flagger station must be able to be seen from the sign. This operation requires additional flagger ahead signs to be placed as the operation and flagger move ahead. If terrain does not allow a motorist to see the flagger from the "flagger ahead sign", the distance between the sign and the flagger must be shortened to allow visual contact. The spacing shall not be less than the required distance base on the highway speed.

3.6 Pilot Car Operations

Pilot car use is appropriate for long work areas to help maintain traffic speeds and to guide traffic through the work areas. If pilot car operators are going to be utilized to relieve on duty flaggers they too shall be certified flaggers. During the pre-activity meeting, discuss any special instructions to ensure everyone understands expectations. Refer to TCP 2 for a pilot car operation.

3.7 Intersection Flagging

When flagging at intersections, a best practice to give flaggers better control of traffic movements, is to reduce motor vehicle traffic approaching the intersection to a single lane whenever possible. This may require lane closures and restricting access to turn pockets with channelization devices (remember to address bicyclists' access). Flaggers will also need to control pedestrian crossing movements. If a Traffic signal is present, it must be either turned off or set to all red "flash" mode.

At no time shall traffic be flagged with an active signal.

The placement of a flagger at the center of an intersection to control traffic is not allowed. The only person allowed to legally control traffic from the center of an intersection is a uniformed police officer. No matter who is performing the intersection flagging, the appropriate advance warning signing is required to be in place.

3.8 Emergency Planning

- Always have an escape plan. Do not have any type of barrier, guardrail, parked vehicles etc. between you and your escape route.

- When leaving the station, drop the flagging paddle in the roadway, then exit at 90 degrees to the path of the oncoming vehicle.

- Devise an audible signal (such as a whistle or horn) which can be heard above the noise of work machinery. **BE ALERT AT ALL TIMES** always keep your mind on your flagging duties.

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Chapter Four

Communicating and Signaling

4.1 Communication

To be an effective, flaggers shall always be able to communicate with one another. Communication can be maintained by:

- **Visual Contact:** This method is effective when flaggers are close enough to see or read each other's STOP/SLOW paddles and to see each other's "ALL CLEAR" signals. It is important to establish with each other before the start of the shift what each signal means to one another, even if the plan is to use radios for the shift, in case of radio failure.

- **Two-Way Radio:** This is the most effective method of communication, even when there is visual contact. Radios should only be used for business purposes, and communications on it should be brief, clear and to the point. It is helpful to carry an extra set(s) of batteries on your persons to maintain constant communication with one another. If there is radio failure and no visual contact, all traffic shall be stopped in all directs until communication is re-established.

- **Flag Carrying:** Also referred to as a baton carry. The driver of the last vehicle in your queue will take a flag, baton, or other material to identify to the other flagger that the last vehicle has passed. This is dependent on the driver to take the initiative and stop at the other flagger as they are exiting the traffic control zone. A helpful alternative is to ask the driver permission to affix a ribbon or string to their antenna. You will still give the driver the directions to stop at the other flagger to have the ribbon removed, but in case the driver fails to stop, the other flagger will have a visual indicator of the ribbon to identify the last vehicle.

It is important to remember that you should only release traffic after receiving the "ALL CLEAR" from your partner. When in doubt, STOP all traffic.

4.2 Signaling to Stop

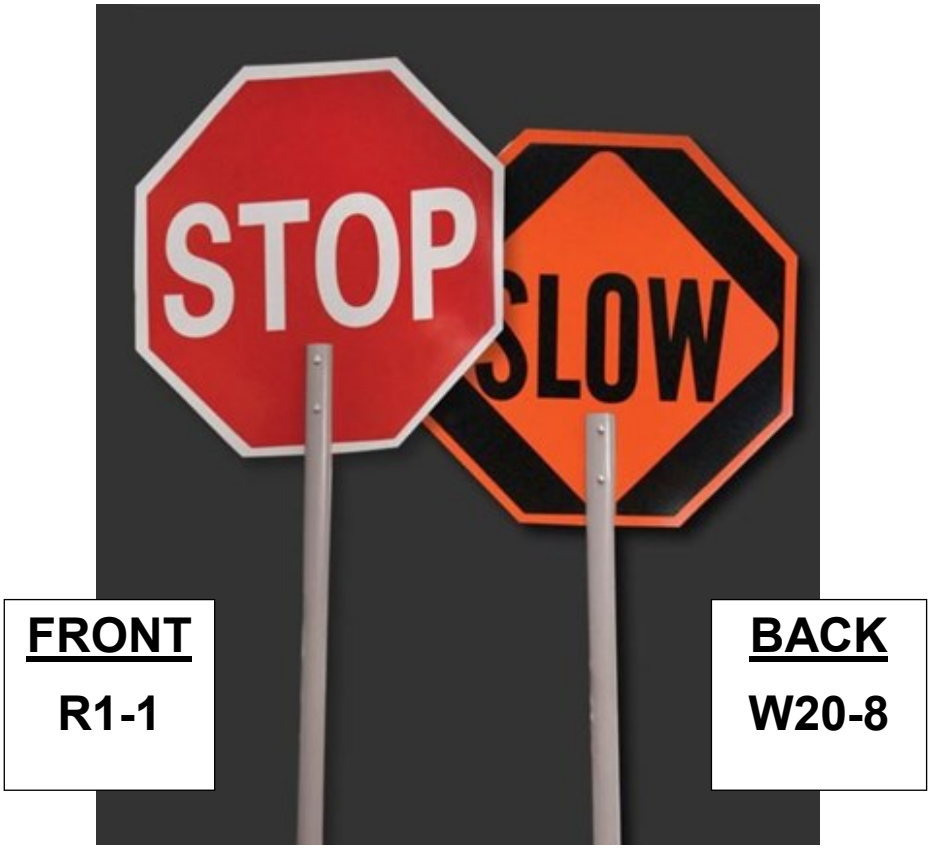
- It is the flagger's responsibility to communicate a clear message to the motorists.

- The paddle and flagger's hand signals are the primary communications method and must be performed with alertness and confidence.

- The 24-inch STOP/SLOW paddle should be considered for hours of darkness and on high-speed roads and can be required by some agencies such as WSDOT.

- The STOP/SLOW paddle should be the primary and preferred hand-signaling device. Use of red flags should be limited to emergency situations. The STOP/SLOW paddle shall have an octagonal shape on a rigid handle. STOP/SLOW paddles shall be at least 18 inches wide with letters at least 6 inches high. The STOP (R1-1) face shall have white letters and a white border on a red background. The SLOW (W20-8) face shall have black letters and a black border on an orange background. When used at night the STOP/SLOW paddle shall be retro reflectorized or illuminated.

- Minimum standard flagging paddle size allowed is 18 inches. The 24-inch STOP/SLOW paddle should be considered for hours of darkness and on high-speed roads and is required by WSDOT standard specifications 9-35.1 for WSDOT projects and local agency projects following the standard specifications. The use of a flashing stop/slow paddle is allowed instead of a standard paddle. Follow the guidance shown in the MUTCD Section 6E.03 for additional information.



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To STOP road users

The flagger shall face road users and aim the STOP paddle face toward road users in a stationary position with the arm extended horizontally away from the body. The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.

To direct road users to PROCEED

The flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body. The flagger shall motion with the free hand for road users to proceed. (Moving the free hand horizontally left to right.)

To ALERT or SLOW road users

The flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body.

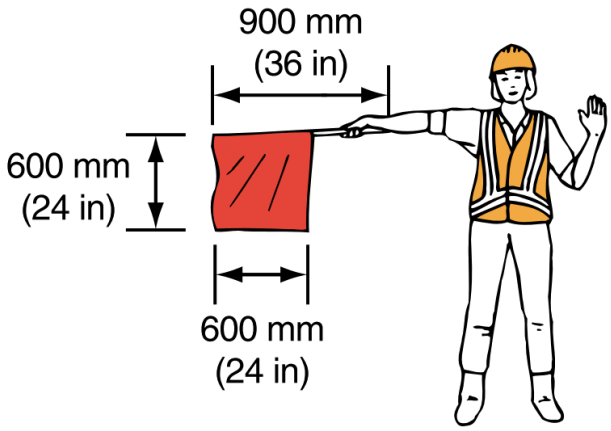
OPTION: To further alert or slow traffic, the flagger holding the slow paddle face toward road users may motion up and down with the free hand, palm down.

4.3 Emergency Situation: Warning Flags

During emergency situations, red flags, meeting the specifications of the MUTCD, may be used to draw a driver's attention to particularly hazardous conditions. In nonemergency situations, a red flag may be held in a flagger's free hand to supplement the use of a sign paddle.

To STOP road users

The flagger shall face road users and extend the flag staff horizontally across the road user's lane in a stationary position, so that the full area of the flag is visible hanging below the staff. The free arm shall be held with the palm of the hand above the shoulder level toward approaching traffic.



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To direct road users to PROCEED

The flagger shall stand facing the road users with the flag arm lowered from the view of the road users and shall motion with the free hand for road users to proceed. Flags shall not be used to signal road users to proceed.

To ALERT or SLOW road users

The flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body.

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

Flags when used shall be red or fluorescent orange red in color, retro reflectorized at night, and shall be a minimum of 24 square inches, and shall be securely fastened to a staff that is approximately 36 inches in length. The free edge of a flag should be weighted so the flag will hang vertically, even in heavy winds.

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4.4 Emergency Situation: Flashlight with a Red Glow Cone

A flagger may use a flashlight with a red glow cone to supplement the STOP/SLOW paddle or flag at any time.

a. **To STOP:** When using ONLY a flashlight with a red glow cone in an emergency situation to inform road users to STOP, the flagger shall hold the flashlight with the left arm extended and pointed down toward the ground, and then shall slowly wave the flashlight in front of the body in a slow arc from left to right such that the arc reaches no farther than 45 degrees from vertical.

b. **To PROCEED:** When using ONLY a flashlight with a red glow cone in an emergency to inform road users to PROCEED, the flagger shall point the flashlight at the vehicles bumper, slowly aim the flashlight toward the open lane, then hold the flashlight in that position. The flagger shall not wave the flashlight.

c. **To ALERT/SLOW:** When using ONLY a flashlight with a red glow cone in an emergency to inform road users to ALERT/SLOW, the flagger shall point the flashlight toward the oncoming traffic and quickly wave the flashlight in a figure eight motion.

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Chapter Five

Traffic Control Devices and Equipment

5.1 Temporary Traffic Control (TTC) Devices

Most TTC devices used in Washington State must meet crashworthy standards of the AASHTO Manual for Assessing Safety Hardware (MASH) 2016. See Standard Specification 1-10.2(2) for more information. (Division 1 General Requirements - Standard Specifications (wa.gov))

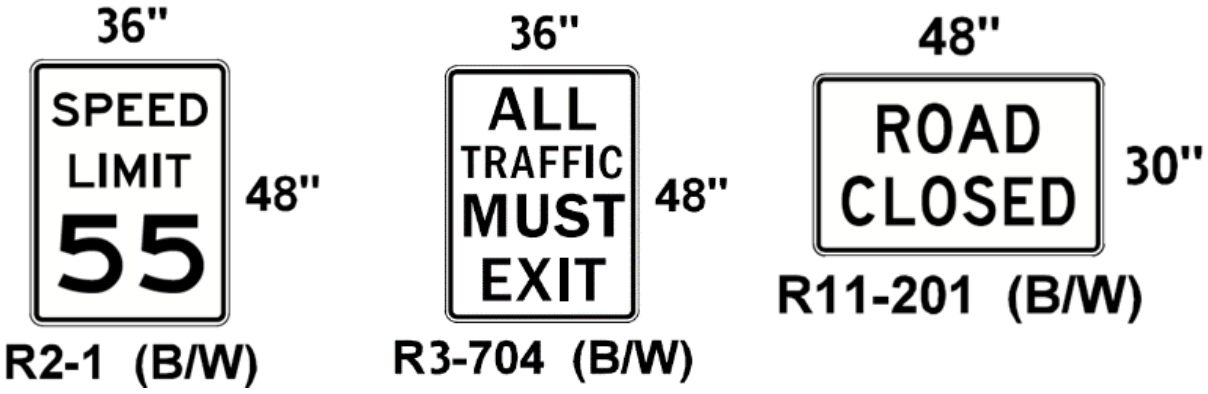
All TTC devices must be kept clean and in an acceptable condition as defined in the "*Quality Guidelines for Temporary Traffic Control Devices"*. A sign or traffic control device determined to be "not acceptable" shall be replaced as soon as possible. Limited copies of the Quality Guidelines book may be obtained from the American Traffic Safety Services Association (www.atssa.com).

5.2 Temporary Traffic Signs

Temporary Traffic Signs including those used in road construction and maintenance zones, fall into three categories.

Regulatory Signs (R-Series) - enforce legal requirements.

Examples:



Note: The speed limits on state highways are set by the State Traffic Engineer and cannot be changed without approval. Roadway surface issues such as loose gravel from chip seal operations, temporary width restrictions or lane shifts, application of a temporary traffic signal are some examples of when a speed limit may need to be reduced as shown on an approved traffic control plan.

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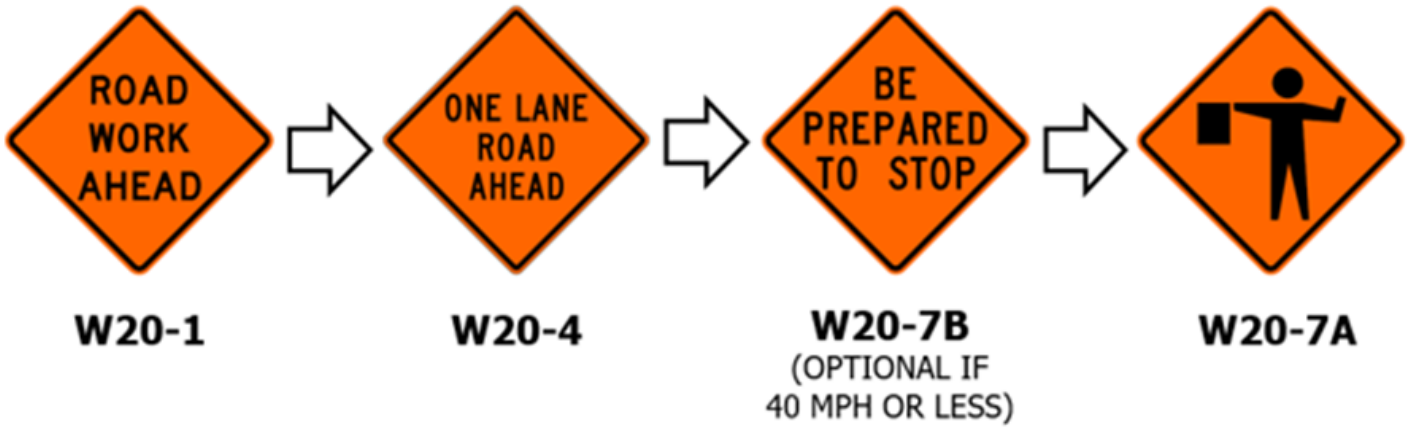
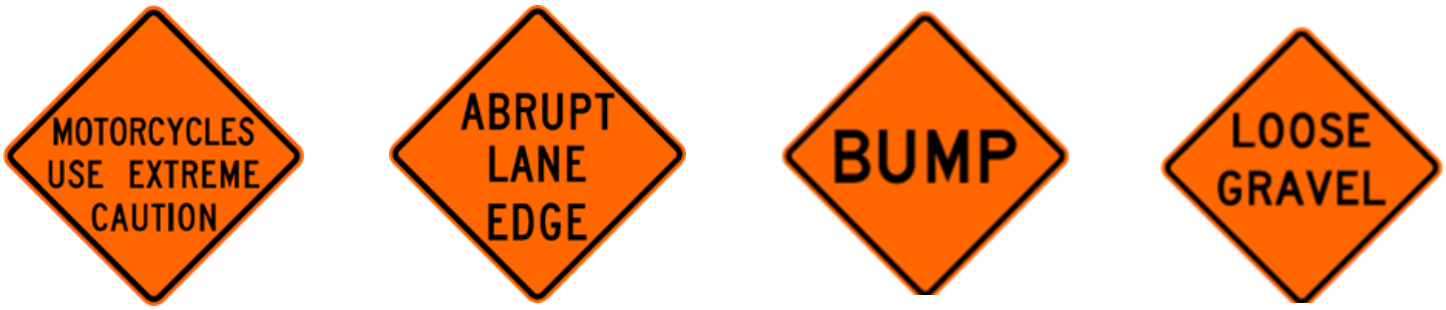
Warning Signs (W-Series) - alerting drivers to specific hazards.

Flagging Example:



Other Examples:



A four-sign sequence is required for all flagging on roadways with posted speeds of 45 mph or higher. The "one lane road ahead" sign may need to be replaced with a more appropriate sign if flaggers are used for short traffic stops for truck crossing, tree falling, or other work and traffic will not be alternated in a single lane. Possible signs may be, Truck Crossing, Road Machinery, Utility Work Survey Crew, Blasting, worker symbol sign or simply a sign saying Workers (this sign could be a very generic yet appropriate solution in many cases)

If the above signs are not available or appropriate for the operation, an acceptable alternative would be to repeat the **"Flagger Ahead"** symbol sign or the **"Be Prepared to Stop"** sign. Again, the preferred method is to use the sign that most appropriately describes the roadway condition or work operation.

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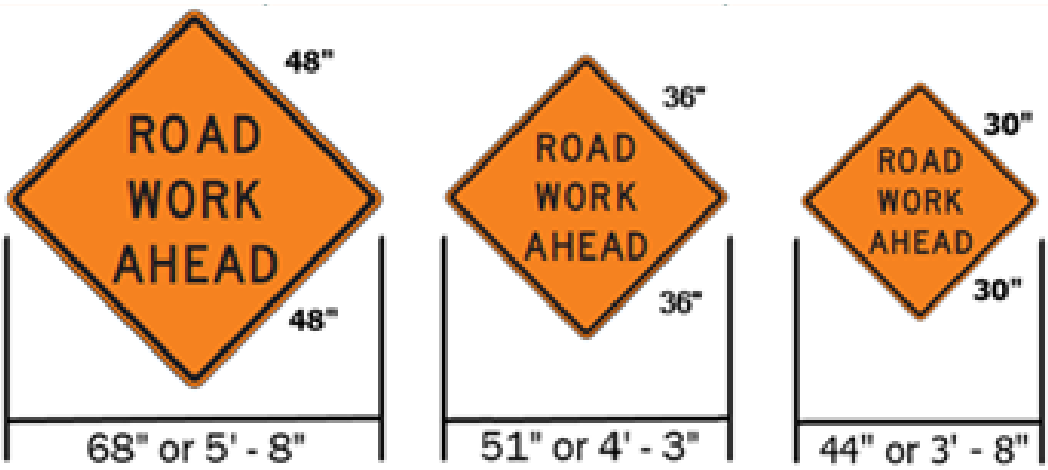
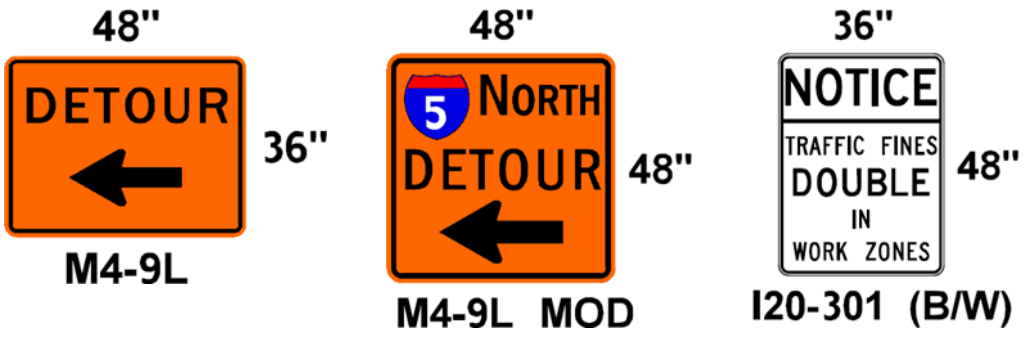
TYPICAL MINIMUM DIAMOND-SHAPE SIGN SIZES		
ROADWAY	WSDOT	MUTCD (TABLE 6F-1, PAGE 578)
FREEWAY (MAINLINE & RAMPS)	48'' X 48''	48'' X 48''
ROADWAYS 45+ MPH	48'' x 48''	36'' X 36''
ROADWAYS 40 MPH or LESS	36'' X 36'' MIN 30'' X 30'' OK (≤ 30 MPH)	36'' X 36'' (35-40 MPH) 30'' X 30'' (≤ 30 MPH)



Guide/Informational Signs (E, G, I, M-Series) - gives motorists information. In the work zone they typically include detour route information.

Examples:



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Temporary signs shall be mounted on portable supports which are designed to yield on impact. The bottom of the signs **must be at least one foot above the traveled way.**

Signs are generally placed on the right-hand side of the road.

Where special emphasis is needed, warning signs may be placed opposite each other, on both the right-hand and left-hand sides of multi-lane roadways.

For more information on temporary signs reference MUTCD Chapter 6F.

A one-foot minimum mounting height is required for temporary signs. Five-foot mounting height is recommended in some case to be more visible above channelizing devices or barriers.

Where it is necessary to add weight to signs for stability, sandbags or other similar ballast may be used, but the top of ballast shall not be more than 4-inches above the Roadway surface and shall not interfere with the breakaway features of the device.

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5.3 Portable Changeable Message Signs (PCMS)

1. Are a supplement to required static signs and shall ***not*** be used to replace required signs.
2. Shall meet the minimum visibility and legibility standards established in the MUTCD 6F.60.
3. The preferred message cycle should consist of **no more than two message displays at 2.0 seconds each**. Refer to MUTCD Table 1A-2 for a list of acceptable message abbreviations. Drivers should be able to read the message cycle twice at the posted speed.
4. Consider use of a truck mounted PCMS for protective and shadow vehicles to allow for maximum flexibility.

When locating a PCMS in the field:

1. Bottom of sign panel shall be a minimum of 7 feet above roadway in urban areas and 5 feet above the roadway in rural areas when it is in the operating mode.
2. Except when the PCMS trailer is actively being moved, it shall be detached from the towing vehicle. **Towing trailer devices with the display active as a mobile operation is not allowed.**
3. Try to place behind guardrail or barrier.
4. Select widened shoulder areas to maintain a minimum 2-foot lateral clearance to the edge of the travelled lane.
5. Place a taper of at least three channelizing devices in advance of the PCMS (drums or cones as appropriate).
6. Consider the other signage in the area and try to space at least 500 feet from other signs (800 feet is preferred).
7. Avoid locations where drivers' attention is focused on decision points like exits and on ramps. Do not place within gore areas and try to place 1,000 feet or more beyond an exit.
8. Avoid placing in areas such as the outside of a curve where it is in the natural path of an errant driver.
9. **Because they are not a crashworthy device, a PCMS is to be removed when it is not displaying any messages.** (They may remain for short durations with no display for staging purposes or when an intermittent message is needed during work operations.) If the PCMS cannot be placed with the guidelines above, then evaluate the added value versus the risk. Use of permanent message signs, when present, may be considered for high impact operations.

Example: Portable Changeable Message Sign (PCMS)

5.4 Arrow Boards

1. Arrow boards shall meet the minimum size, visibility, legibility distance, number of elements, and other specifications as shown in the MUTCD Section 6F.61.
2. Used on multi-lane roads for during lane closures. A separate arrow board is required for each lane being closed.
3. Arrow boards in arrow or chevron modes shall not be used on a two-lane, two-way roadway.
4. Arrow boards shall not be used to laterally shift traffic.
5. Arrow boards shall be used in the caution mode when used for shoulder closures.
6. Four-corner flash mode shall be used to indicate caution. The Double Diamond or flat bar caution modes are not allowed.
7. The arrow board shall be located behind channelizing devices (unless used in mobile operations where it is truck mounted).
8. An arrow display mounted on a shadow (early warning) vehicle is allowed on mobile lane closure operations.
9. Type “C” arrow boards are required for high-speed, stationary lane closures. Type “B” arrow boards are allowed for maintenance and mobile lane closure operations. (See MUTCD Section 6F.61 for additional information on arrow boards.)
10. **If the arrow board is not in use, it should be removed or shielded.**

Figure 6F-6. Advance Warning Arrow Board Display Specifications

Operating Mode	Display (Type C arrow board illustrated) (right arrow shown; left is similar)
1. At least one of the three following modes shall be provided:	
Flashing Arrow	Merge Right
Sequential Arrow	Merge Right
Sequential Chevron	Merge Right
2. The following mode shall be provided: Flashing Double Arrow	Merge Right or Left
3. At least one of the following modes shall be provided: Flashing Caution or Alternating Diamond Caution	Flashing Caution

Arrow Board Type	Minimum Size	Minimum Legibility Distance	Minimum Number of Elements
A	48 x 24 inches	1/2 mile	12
B	60 x 30 inches	3/4 mile	13
C	96 x 48 inches	1 mile	15
D	None*	1/2 mile	12

*Length of arrow equals 48 inches, width of arrowhead equals 24 inches

5.5 Channelizing Devices

When construction or maintenance activities block a portion of a roadway, channelizing devices provide for smooth and gradual vehicular traffic flow from one lane to another, onto a bypass or detour, or into a narrower traveled way. They are also used to channelize vehicular traffic away from the workspace, pavement drop-offs, pedestrians or shared use paths, or opposing directions of vehicular traffic.

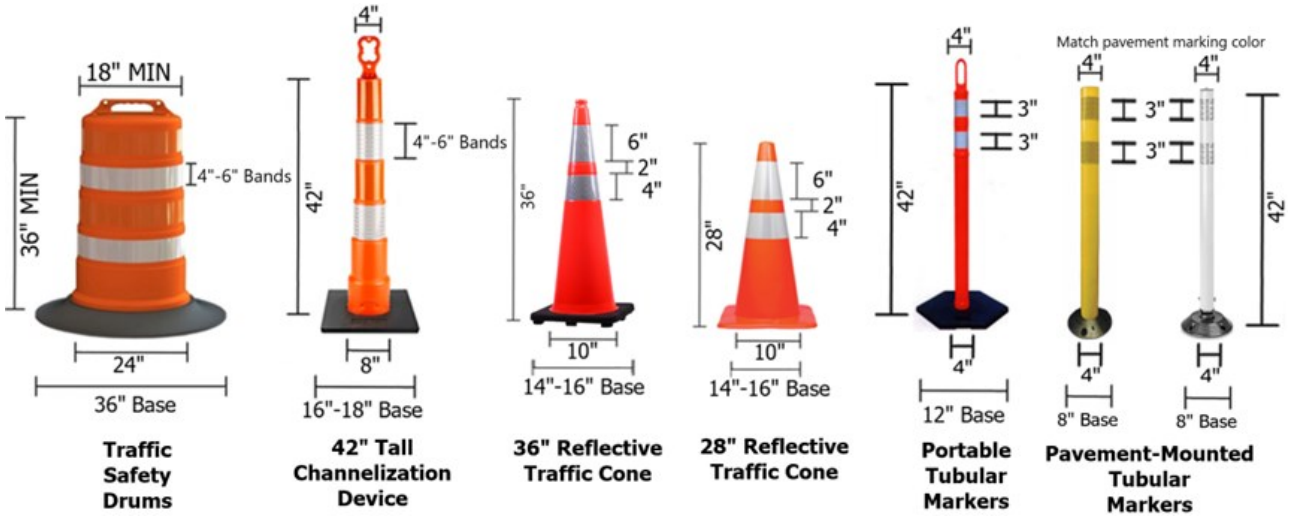
- Traffic safety cones are the most common devices used to separate and guide traffic in a work zone. The minimum cone size is 18 inches tall. **For speeds of 45 mph or higher, and during nighttime operations, and all WSDOT projects cones must be a minimum of 28 inches tall and have retro-reflective bands.**

- Tubular markers having a uniform diameter and at any height, should only be used where space restrictions do not allow for other more dominate devices. Tubular markers may be used to divide opposing traffic lanes, divide open lanes in the same direction on low-speed roads and to delineate the edge of a pavement drop off.

- Tall Channelizing devices are a minimum of 42 inches tall, using a tapered cone type shape and are a good option for use on high-speed roadways in lieu of 28-inch cones due to their greater visibility.

- Traffic safety drums shall be a minimum 36 inches tall and are the most dominant and preferred device for high-speed high-volume highways because they have the greatest visibility. Drums shall have horizontal and circumferential retroreflective banding around the drum for visibility.

- Vertical flat panel devices and devices with directional stripe patterns are not allowed due to frequency of placement errors.



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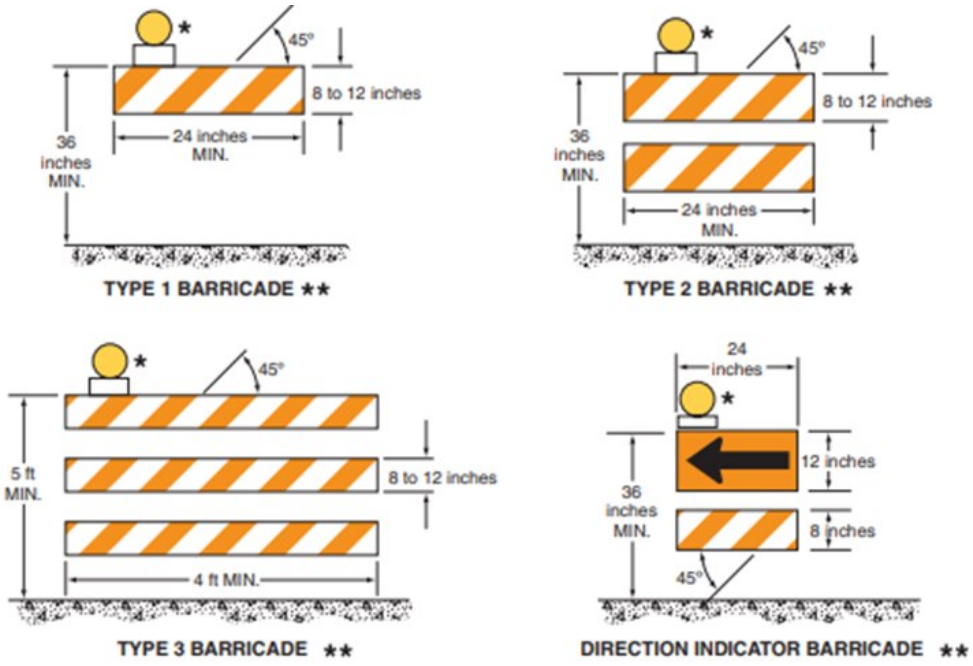
5.6 Barricades

Generally used for road or ramp closures along with other channelizing devices and appropriate signing. Barricades used in work zone applications are portable devices with three primary types:

1. **Type 1 Barricade** – Used on lower speed roads and streets to mark a specific hazard or can be used for sidewalk closures as appropriate.

2. **Type 2 Barricade** – Used on higher speed roadways and has more reflective area for nighttime use to mark a specific hazard.

3. **Type 3 Barricade** – Used for road closures.



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

Striping - The 2009 Edition of the Manual on Uniform Traffic Control Devices (MUTCD) discusses Type III Barricades under Section 6F.68. The MUTCD states that Type III Barricades should be used to close or partially close a road. The stripes on barricade rails shall be alternating orange and white retro reflective stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Barricades used on freeways, expressways, and other high-speed roadways shall have a minimum of 270 square inches of retro reflective area facing road users.

Signs Mounted Separately from Barricades - The best method of using signs with barricades is to mount the sign on a crashworthy support with a one-foot mounting height just ahead of the barricade or on a five-foot mounting height just behind the barricade. The advantage of this system is that both the barricade and the sign are both crashworthy.

5.7 Warning Lights

Warning lights are either flashing (type A or B) when mounted to barricades/sign installations or, steady burn (Types C, or D) when mounted on channelizing devices. **Attach warning lights per the manufacturer's recommendations to be crashworthy**. See the MUTCD Section 6F.83 for additional information.

There are four types of warning lights:

1. **Type A** (low-intensity flashing)
2. **Type B** (high-intensity flashing)
3. **Type C** (steady burn)
4. **Type D** (360-degree steady burn)

5.8 Automated Flagger Assistance Device (AFAD)

An AFAD is used instead of a paddle to control the movements of traffic and operated remotely by a flagger located off the roadway and away from traffic increasing flagger safety. When sight distance to the flagging station and/or flagger escape routes will be limited, consider using an AFAD. A pilot car operation is still recommended for longer work areas. (See TCP 2). Additional information is available concerning AFAD use in the MUTCD Section 6E. (See TCP 3).

"Red/Yellow Lens" AFADs are the required type per WSDOT specifications.

5.9 Portable Signal Systems

Portable traffic control signals are trailer mounted traffic signals used in work zones to control traffic instead of using an actual flagger. The maximum distance between signal heads is 1,500 feet to minimize wait time and clearance interval. These versatile, portable units allow for alternative power sources such as solar power, generator, and deep cycle marine batteries in addition to AC power. Portable signals are typically used in work zones to control traffic such as temporary one-way operations along a two-lane, two-way highway where one lane is closed, and alternating traffic movements are necessary.

5.10 Portable Temporary Rumble Strips

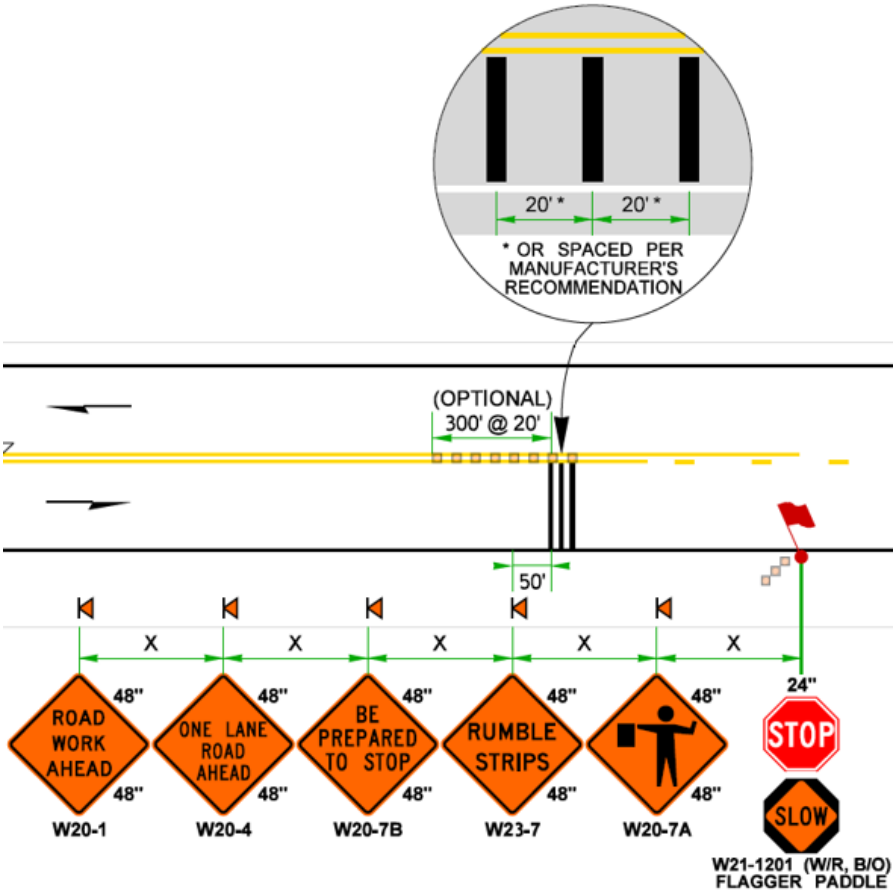
The fundamental purpose is to alert a distracted driver through the audible and rumble effect, particularly on high-speed, very rural highways approaching flagging stations, or temporary signals. Portable rumble strips stay in place with friction alone, there are no nails or glues that hold it to the roadway as they weigh over 100 pounds per strip, but they need to be checked during the hourly inspections at a minimum. Portable rumble strips and they should not be placed in horizontal curves.

Currently, only the following devices are allowed on WSDOT projects:

- Temporary Portable Rumble Strips | RoadQuake 2™ | PSS (pss-innovations.com)
- TrafFix Alert High Speed | TrafFix Devices

Temporary rumble strips are placed transversely (perpendicular to flow of traffic) across the approaching lane in two sets of 3 at spacing based on the manufacturer's recommendation.

When temporary rumble strips are in place, install the W23-7 "RUMBLE STRIPS" sign about 50'± in advance. Like the "BUMP" sign, the "RUMBLE STRIPS" sign needs to be closer to the rumble strips than "X", which can be 800'± for 60-65mph highways.



5.11 Radar Speed Display Signs (RSDS)

The fundamental purpose is speed reduction benefits, which average about 5 mph. National research has repeatedly shown the RSDS, also known as “speed trailer,” as one of the most effective devices at reducing vehicle speeds. RSDS are most effective when they include an existing posted speed limit sign.

5.12 Flares

All work vehicles should carry a supply of flares. Use flares only to alert drivers to emergencies.

Emergencies are defined as unforeseen occurrence endangering life, limb, or property. Use caution at incident sites where flammable materials, such as fuel spills, are suspected. Consider carrying electronic flares or orange/red glow sticks for use instead of incendiary flares where flammable materials are suspected. Electronic flares or light sticks should be removed when the incident has been terminated.

Examples:
Electronic Road Flare

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5.13 Temporary Barriers and Impact Attenuators

Temporary Barriers are mostly constructed of concrete. Steel barriers are also becoming more available, some with castors allowing greater portability and barrier openings for work area access. Temporary barriers are recommended for long-term, stationary work zones.

Consider the following for use of temporary barriers:

1. Work areas where there is a no escape route for workers such as internal lane work, work zones in tunnels, on bridges, next to retaining walls, etc.
2. When workers must be within a lane width of high speed and high volume of traffic.
3. When traffic needs to be protected from equipment, materials, drop-offs, or other conditions that must remain until the work is completed.
4. The approach ends of temporary barriers must be adequately protected with a temporary impact attenuator if the barrier end cannot be tapered outside the clear zone.

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5.14 Truck-Mounted Attenuators

A truck-mounted attenuator (TMA) is a portable impact attenuator attached to the rear of a host vehicle with a weight range in accordance with the manufacture's recommendations.

The TMA is used as a shield to prevent errant vehicles from entering the work area. During use, the attenuator shall be in the fully deployed position. For stationary operation, the parking brake shall be set, and the tires aligned straight as per manufacturer's direction. A roll ahead distance is required between the TMA and the work area based on the host vehicles weight and the traffic speed. Roll ahead distance is a clear zone that should never have anything or anyone within it.

Considerations for the use of TMAs:

1. TMA use is always recommended but may be required on freeway or high-speed high-volume highway work areas.
2. Operations requiring personnel in the work zone on foot or lift-bucket truck operations, a TMAs should be strongly considered.
3. See the TCPs for TMA placement and roll ahead distance requirements.

a

5.15 Vehicles

- **Work Vehicle** – All work vehicles within the work zone must be equipped with an approved flashing warning beacon with 360-degree visibility. Consideration must be given to the location of workers in relation to the work vehicles. Worker safety can be jeopardized if the motorists' attention is focused on the work vehicle and beacon.

STATIONARY TRANSPORTABLE ATTENUATOR ROLL AHEAD DISTANCE					
HOST VEHICLE WEIGHT 9,900 TO 22,000 lbs.			HOST VEHICLE WEIGHT 22,001+ lbs.		
UP TO 40 MPH	45-55 MPH	60+ mph	UP TO 40 MPH	45-55 MPH	60+ MPH
100 feet	123 feet	172 feet	74 feet	100 feet	150 feet

- **Protective Vehicle** – A vehicle strategically placed in advance of the work area with the proper roll-ahead distance to protect workers if impacted. A TMA is always recommended and may be required in some operations. Refer to the TCPs for specific information on roll ahead distances and TMA requirements.

- **Shadow Vehicle** – A vehicle used in a mobile operation to provide advance warning information for motorists and to operate as a protective vehicle for the work vehicle. These vehicles often include a truck mounted Portable Changeable Message Sign/ Arrow Board to provide temporary traffic control information to the motorists. Consider turning the flashing beacon off to reduce any confusion with arrow board display.

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Chapter Six

Temporary Traffic Control Zone

6.1 Temporary Traffic Control Zone

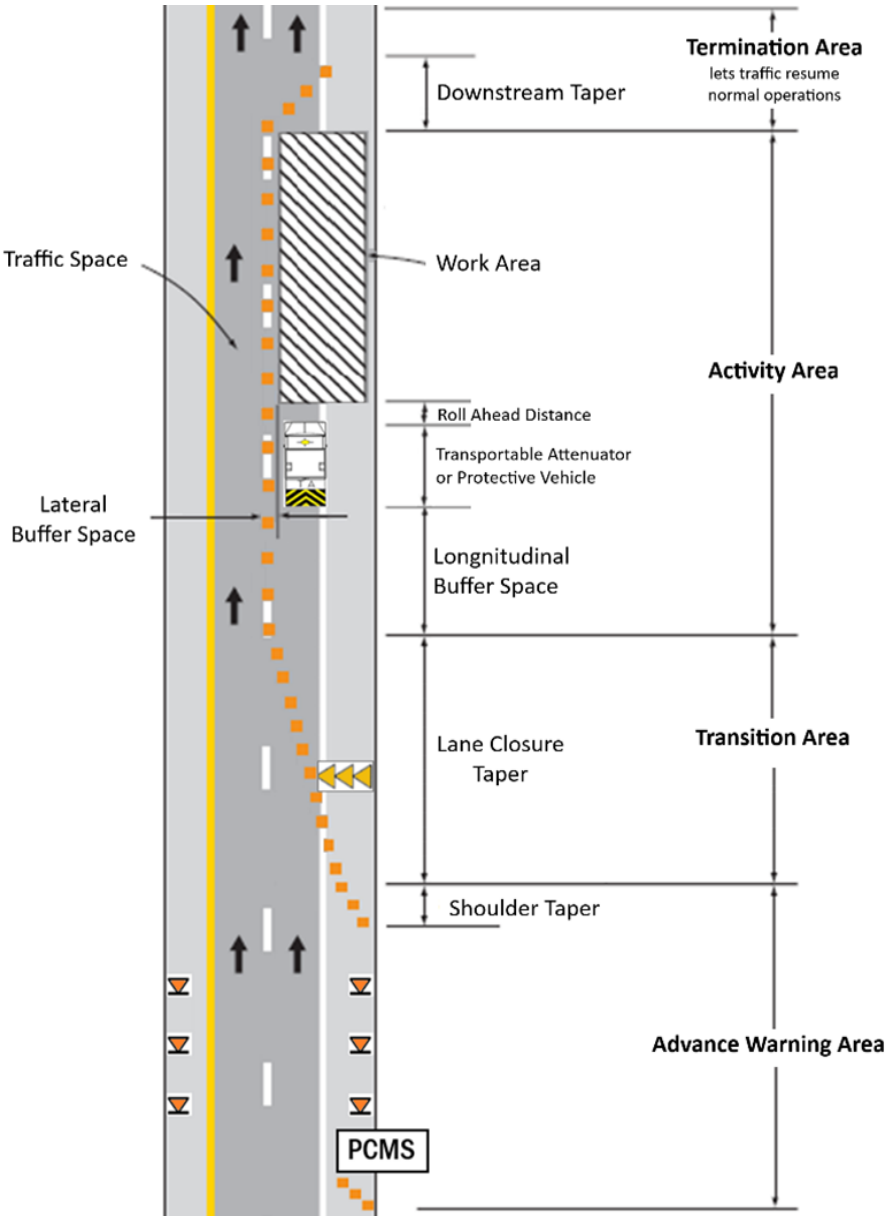
Temporary Traffic Control Zone—an area of a highway where road user conditions are changed because of a work zone or incident using temporary traffic control devices, flaggers, uniformed law enforcement officers, or other authorized personnel.

The temporary traffic control zone is designed to:

- Alert the road user that there is work on or near the roadway ahead.
- Inform the road user what actions they need to perform, like being prepared to stop, merge left or right or follow detour routes.
- Guide the road user through or around the work zone.
- Provide buffer space around the work area to increase safety in case of driver errors.
- Provide bicyclists, pedestrians, including those with disabilities, safe passage through the temporary traffic control zone.
- Provide adequate space for work activities to be performed.

A temporary traffic control zones begin at the first warning sign (or PCMS) through the last traffic control device and typically consist of the four areas and shown in the figure below (2-lane freeway shown, other work zones similar):

1. **Advance Warning Area**
2. **Transition Area**
3. **Activity Area**
4. **Termination Area**



6.2 Advanced Warning Area

This is the section of the temporary traffic control zone where motorists are informed about the upcoming work zone and what to expect. This area will be where you place the advanced warning signs such as “Road Work Ahead”, “One Lane Road Ahead”, and “Flagger Ahead”. A PCMS may be shown on the traffic control plan as the first device ahead of the warning signs. Remember, four warning signs are required in the advanced warning area on 45 MPH or higher roadways when flagging.

Signs are generally installed on the right-hand side of the road. Where special emphasis is needed, warning signs may be placed on both the right- and left-hand side of the road. When placed on portable sign stands, the bottom of the sign must be at least one foot above the traveled roadway. In areas with high wind, sand bags, also known as ballast, can be used, the top of the ballast shall not be any taller than 4 inches above the traveled roadway and shall not interfere with the breakaway features of the device.

All signs used during the hours of darkness must be made of retroreflective sheeting so the sign looks the same in both daylight and darkness.

WSDOT traffic control plans use “X” to denote sign spacing.

Where it is necessary to add weight to signs for stability, sandbags or other similar ballast may be used, but the top of ballast shall not be more than 4-inches above the Roadway surface and shall not interfere with the breakaway features of the device.

SIGN SPACING = X (1)		
FREEWAYS & EXPRESSWAYS	50-70 MPH	1500’ +/-
RURAL HIGHWAYS	60-65 MPH	800’ +/-
RURAL ROADS	45-55 MPH	500’ +/-
RURAL ROADS & URBAN ARTERIALS	35-40 MPH	350’ +/-
RURAL ROADS & URBAN ARTERIALS RESIDENTIAL & BUSINESS DISTRICTS	25-30 MPH	**200’ +/- (2)**
URBAN STREETS	25 MPH OR LESS	**100’ +/- (2)**
(1) ALL SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS AND DRIVEWAYS. **(2) THIS SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.**		

6.3 Transition Area (Tapers)

Tapers are used to direct traffic out of their normal path (they are also used in termination areas).

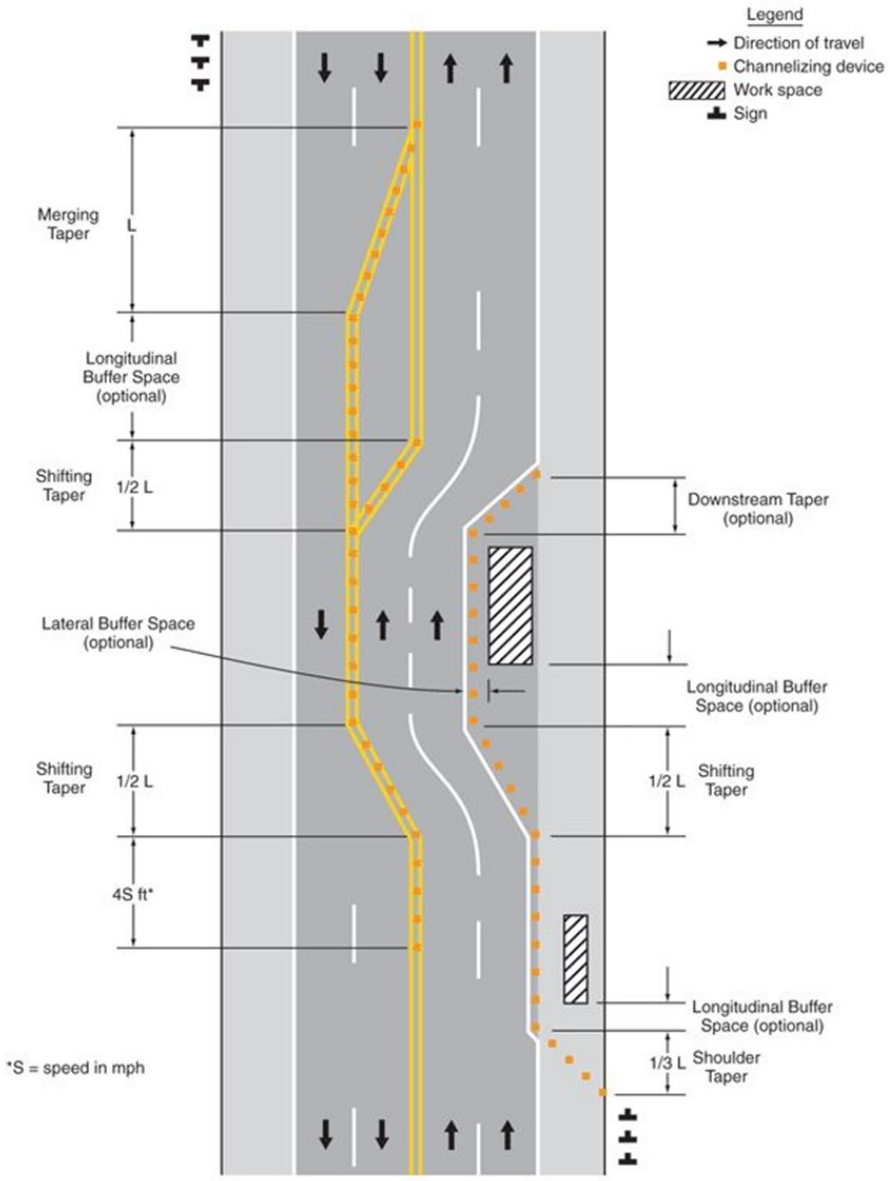
Whenever tapers are to be used near an interchange ramp, crossroads, curves, or other influencing factors, the location of the tapers should be adjusted to avoid these areas.

Tapers are created by using a series of channelizing devices and/or pavement markings to move traffic out of or into the normal path.

TAPER TYPES: Per MUTCD Table 6C-3	
Types	**Minimum Taper Length**
Merging Taper	at least L
Shifting Taper	at least 0.5 L
Shoulder Taper	at least 0.33 L
One-Lane, Two-Way Traffic Taper	50 feet min - 100 feet max
Downstream Taper	100 feet per lane

Types of tapers are shown in Figure 6C-2 and 6C-3

Figure 6C-2. Types of Tapers and Buffer Spaces



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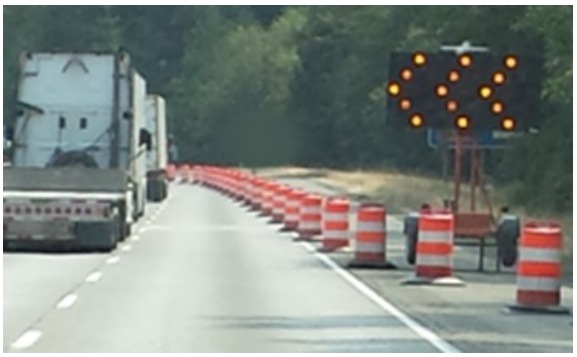
Merging Taper = L minimum

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

Minimum Lane Closure Taper Length = L	
Posted Speed Limit	**Formula**
≤ 40mph	$L = \frac{W * S^2}{60}$
≥ 45mph	$L = W * S$
L = Minimum Lane Closure Taper Length (feet) W = Lane Width (feet) S = Posted Speed Limit (miles per hour)	



The following table assumes 12-foot wide lanes and rounds the merge (lane closure) taper length up based on maximum channelization device spacing:

MINIMUM LANE CLOSURE TAPER LENGTH = L													
LANE WIDTH	SPEED (MPH)	20	25	30	35	40	45	50	55	60	65	70	75
12'	L (feet)	80	140	180	270	330	540	600	680	720	800	840	920

Washington State Channelizing Device Spacing Chart

MPH	Taper*	Tangent
50/70	40	80
35/45	30	60
25/30	20	40

*One-lane, two-way traffic and downstream tapers shall have 20 foot device spacing at any speed limit.

NOTE: These distances are maximum

Shifting Taper = 1/2 L minimum

Used when traffic is moved laterally into a different travel path but the number of through lanes is not reduced. A shifting taper should have a length of ½ L but when space is available, a longer taper can be beneficial.

W1-3R
(30 MPH OR LESS)

W1-4L
(35+ MPH)

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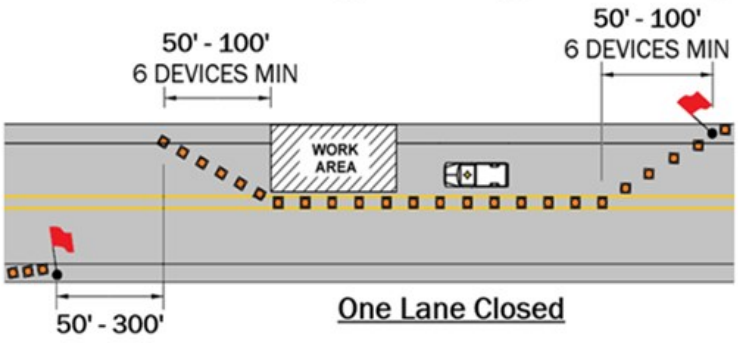
Shoulder Taper = 1/3 L minimum

Used to close a shoulder when work activities occupy the shoulder or used in advance of a lane closures when drivers might be mistake the shoulder as a driving lane. Shoulder tapers should have a length of at least 1/3 L. If a shoulder is used as a travel lane, either through practice or during a temporary traffic control activity, a normal merging or shifting taper should be used.

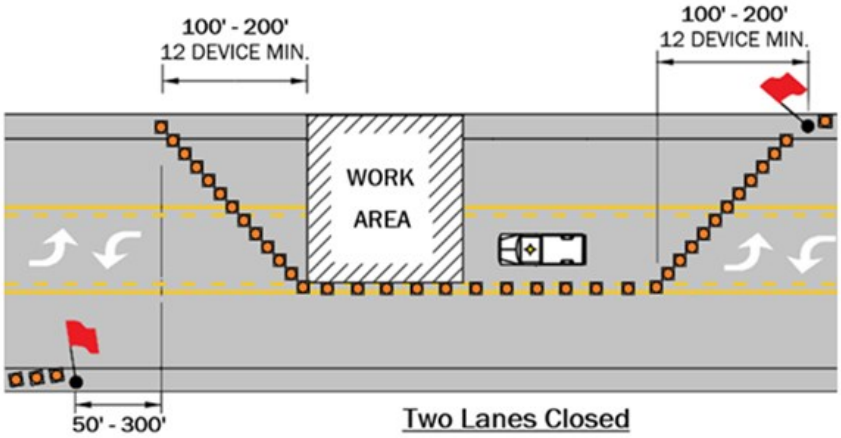
One-Lane, Two-Way Taper = 50’ to 100’

Also known as a flagger taper, used to guide traffic into the open lane when the flagger directs traffic to proceed. ***This taper length is not calculated***, it will be the same length regardless of the speed limit. A one-lane, two-way taper is used in advance of an activity area that occupies part of a two-way roadway in such a way that a portion of the road is used alternately by traffic in each direction. A one-lane, two-way taper is denoted by “50-100 feet” on traffic control plans. This taper is used for flagging operations only and shall include a minimum of 6 channelization devices separated at a maximum of 20 foot spacing.

Below shows a two-way, one-lane flagger controlled **single** lane closure configuration and photo:



Below shows a two-way, one-lane flagger controlled **double** lane closure configuration and photo:



6.4 Activity Area

This is the section of the roadway where work is being conducted. The activity area is comprised of four components:

Work Space

The area where workers and equipment occupy the roadway. The work area may be stationary or may move as work progresses.

In long duration work zones, the work area and traffic space may be separated by using temporary barriers (concrete or steel) or other positive protection devices.

For shorter durations where barriers are not feasible, consider increasing the distance between the two spaces by closing additional lanes or shifting traffic away from the work area so that motorists or workers who stray out of their respective spaces can recover and return to the proper space.

Traffic Space

Traffic space is the portion of the highway in which road users are routed through the activity area.

Longitudinal Buffer Space

A longitudinal space begins at the end of the taper ending at the protective vehicle. Workers, equipment, vehicle(s), or materials should **not** be stored or positioned within this space as it provides a recovery area for errant vehicles to come to a stop. WSDOT recommends a full buffer space when feasible, but they are optional per the MUTCD Section 6C.06. The MUTCD **Table 6C-2 "Stopping Sight Distance as a function of Speed" is used to determine the length of the longitudinal buffer space.**

Table 6E-1 / 6C-2. Stopping Sight Distance as a Function of Speed

Speed*	Distance
20 MPH	115 feet
25 MPH	155 feet
30 MPH	200 feet
35 MPH	250 feet
40 MPH	305 feet
45 MPH	360 feet
50 MPH	425 feet
55 MPH	495 feet
60 MPH	570 feet
65 MPH	645 feet
70 MPH	730 feet
75 MPH	820 feet

*posted speed, off-peak 85th-percentile speed prior to work starting, or the

Lateral Buffer Space

The space between an open lane of traffic and the adjacent work area, temporary barrier, work vehicle, protective vehicle, shadow vehicle or drop-off. A minimum of 2-foot lateral buffer space or more may be recommended.

Channelization devices used to close a lane or shoulder should not encroach into adjacent open lanes. If encroachment is necessary, closing the lane is recommended to provide lateral buffer space to the work zone.

In the case of short-term lane closure operations, the adjacent lane may need to be closed or traffic may need to be temporarily shifted onto a shoulder to maintain a lateral buffer space.

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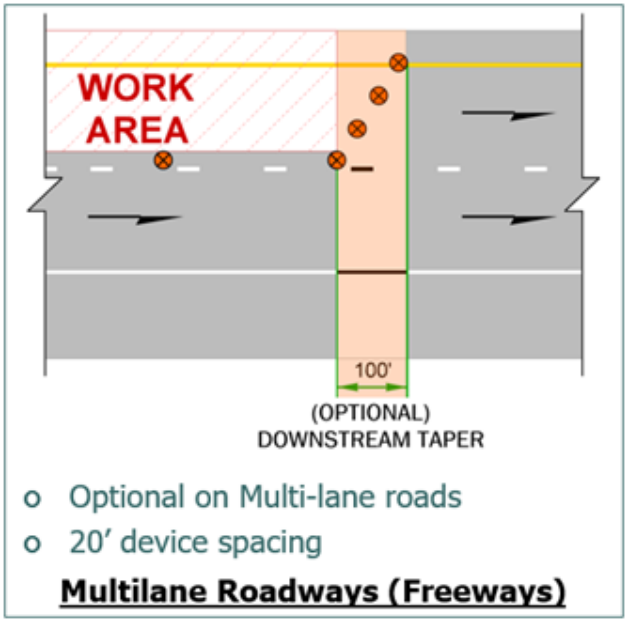
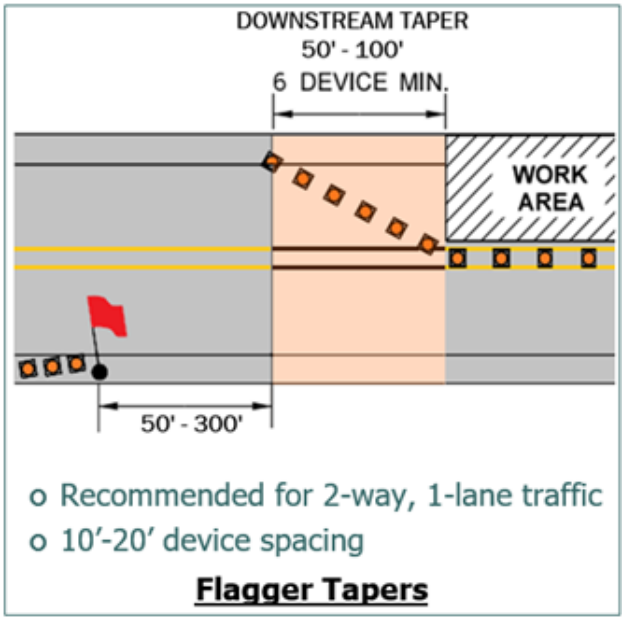
6.5 Termination Area

This is the area of the roadway where the road users return to their normal path of travel. The termination area extends from the end of the activity area to the last temporary traffic control devices, such as an “End of Road Work” sign, or a downstream taper.

Downstream Taper (used in the termination area)

A downstream taper should have a length of 50-100 feet per lane with 6 devices placed at a spacing of approximately 20 feet.





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6.6 Installation and Removal of a Temporary Traffic Control Zone

Workers placing and removing temporary traffic control devices must be on the roadway which is open to traffic creating a more unexpected situation for the driver than the actual work zone itself. To minimize worker exposure to traffic and driver confusion, it's essential that the installation and removal operations proceed in an organized manner and be accomplished as quickly as possible. Prior to the beginning of any operation and before any crewmember is exposed to traffic, the crew will discuss pre-activity safety relative to the installation or removal of the TTC devices as shown on the Traffic Control Plan (TCP).

- Installation and removal shall be done in a manner which cause the least risk to traffic and provides for the safety and protection of the workers involved.
- Devices shall be installed in the direction that traffic is moving, this is referred to as "downstream".
- The first device placed is the first advanced warning sign, which is typically the "Road Work Ahead" sign or symbol. The installation then proceeds downstream with the remaining advanced warning signs, then the transition area, and finally the termination area.
- The vehicle being used to haul the devices shall be highly visible with at least rotating beacons or strobe lights. Shadow vehicles used for the establishment of the temporary traffic control zone are recommended for additional safety, and if possible, utilizing a TMA.
- When possible, the temporary traffic control devices shall be removed in the reverse order of installation. This requires the crew to move "upstream" or against traffic through the work zone. If using a vehicle to pick up devices, the vehicle must have its headlights, beacons, and/or strobes on.

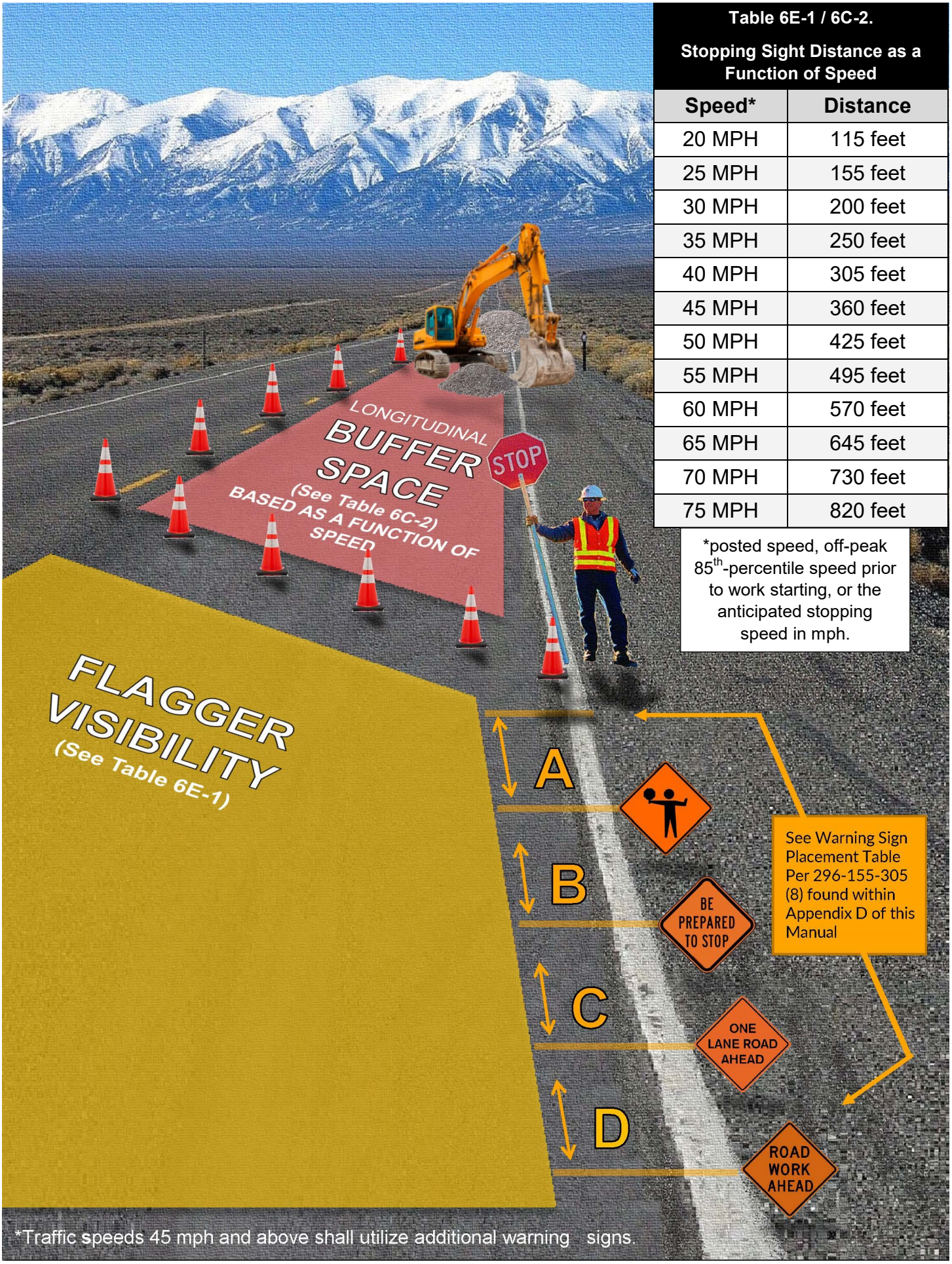

Table 6E-1 / 6C-2.

Stopping Sight Distance as a Function of Speed

Speed*	Distance
20 MPH	115 feet
25 MPH	155 feet
30 MPH	200 feet
35 MPH	250 feet
40 MPH	305 feet
45 MPH	360 feet
50 MPH	425 feet
55 MPH	495 feet
60 MPH	570 feet
65 MPH	645 feet
70 MPH	730 feet
75 MPH	820 feet

*posted speed, off-peak 85th-percentile speed prior to work starting, or the anticipated stopping speed in mph.

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Chapter Seven

Other road users and considerations

7.1 Pedestrians, Bicyclists and other considerations

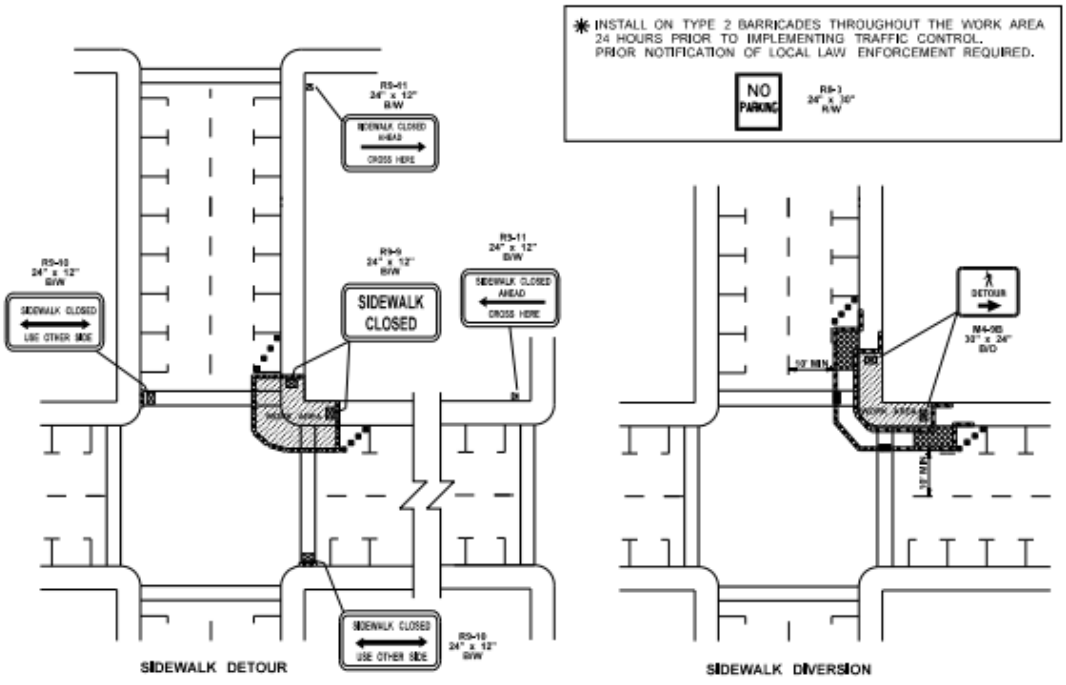
Consideration shall be given to pedestrian and bicycle traffic where appropriate. Provide an alternate route when existing facilities must be temporarily interrupted due to work operations. Alternative routes need to be clearly delineated and separated from the work activities. Refer to MUTCD Chapter 6D for additional requirements and TCD 9 of this manual for a typical plan for pedestrian traffic control.

Pedestrians

- **All pre-existing ADA compliant pedestrian facilities within the work zone must continue to comply with ADA requirements for access during work operations. Recommended best practices and technical guidelines can be found in the Public Right-of-Way Accessibility Guidelines (PROWAG).** Consider the following when addressing pedestrian issues within and around work zones:
- Pedestrian accessibility through or around the work area must be accounted for prior to starting work. If temporary pedestrian ramps are necessary, see the Plan Sheet Library under the Standard Plans site.
- Pedestrians should not be led into conflicts with work vehicles and equipment, or with vehicles moving through or around the work site.
- Pedestrians should be provided with an accessible, convenient path that replicates as nearly as practical the characteristics of the existing sidewalks or a footpath.

- Do not place signs and other traffic control devices within the pathway.

- **For Sidewalk closures, advance closure/ direction signs are required at the nearest upstream crossing to minimize pedestrian's need to retrace their steps.**



TCD 9

TYPICAL INTERSECTION PEDESTRIAN TRAFFIC CONTROL

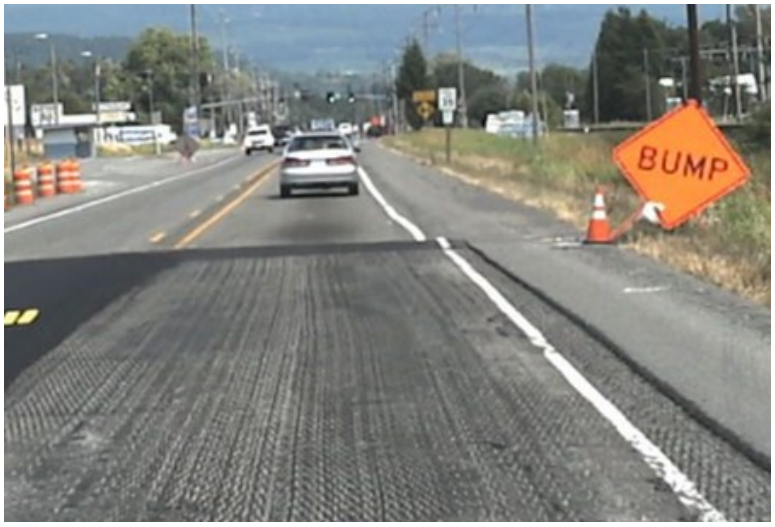
Bicyclists

- Bicycles have a legal right of access to most highway facilities and provisions for their safe conduct through work zones are necessary.
- Provide for and sign an appropriate alternate route when activities close a designated (signed) bicycle path or shoulder bikeway. Where horizontal separation for bicycles and pedestrians existed prior to work, consider separating during work.
- When laying out alternative bicycle paths, make sure no overhead obstructions present a direct hazard to normal bicycle operation.
- Riding surfaces are important for safe bicycle operation. Loose gravel, uneven surfaces, milled pavement, and various asphaltic tack coats endanger the bicyclist. Consider the condition of the surface the bicyclist will be required to use.

Motorcyclists

The driving or roadway surface is also important for motorcyclist's safety. The same surfaces that are a problem for bicyclists are also difficult for motorcyclists. Stability at high speed is a far greater concern for motorcycle operations than cars on grooved pavement, loose gravel, milled asphalt, and abrupt edge tapers from existing pavement down to milled surfaces. Signing to warn motorcyclists of these conditions in a work zone is required by RCW 47.36.200 and WAC 468-95-305 .

The "Motorcycles Use Extreme Caution" sign shall be placed in advance of the appropriate condition warning signs when the condition exists. These signs will be required during non-working hours if the condition exists at the end of the work shift.



Schools

Work zone operations in the vicinity of schools require consideration to ensure that conflicts are kept to a minimum. Issues that should be considered are:

- Student path to and from the school.
- Parent drop off and pickup access.
- Bus movements for loading and unloading students.
- Coordination with crossing guards.
- School hours to minimize impacts.

Grade Crossings

When a grade crossing exists either within or in the vicinity of a temporary traffic control zone, lane restrictions, flagging or other operations shall not be performed in a manner that would cause highway vehicles to stop on the railroad or light rail transit agency tracks, unless a flagger or informed law enforcement officer is provided at the grade crossing to minimize the possibility of highway vehicles stopping on the tracks, even if automated warning devices are in place. The grade crossing is considered as being 15 feet on either side of the closest rail and furthest rail.

Refer to TA-46 in Chapter 8 for a typical TCP involving grade crossings.

The agencies that are responsible for the operation of the rails shall be contacted when any temporary traffic control zone may directly or indirectly influence the flow of traffic.

7.2 Work Duration

Work Duration is an important factor for determining the number and types of devices to be used in a TTC zone, as well as the traffic control plan that is the best fit for the work zone. Per the MUTCD Section 6G.02, the five categories of work duration and their time at a location shall be:

1. Long-Term Stationary: Work that occupies a location more than 3 days. Work that is to be completed in a long-term stationary closure will include nighttime requirements that will need to be met. Per WAC 296-55-305(7)(b), if flaggers are used on a job that will last more than one day, a current site-specific Traffic Control Plan is required.

2. Intermediate-Term Stationary: Work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour. Intermediate-term stationary projects extend into the hours of darkness, nighttime flagging requirements will need to be met.

3. Short-Term Stationary: Daytime work that occupies a location for more than 1 hour within a single daylight period.

4. Short-Duration: Work that occupies a location up to 1 hour. Safety should not be compromised in short duration work zones, all advance warning signs and required number of channelization devices are still a requirement.

5. Mobile: Work that moves intermittently or continuously. If flaggers are to be used in a mobile work zone, all signs and devices are still a requirement. Per the WAC 296-155-305(8) if a flagger is working in a mobile work zone the flagger must be within 1500 feet of the “Flagger Ahead” sign or symbol and the flagging station must be visible from the sign.

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Chapter Eight

Stationary Work Zones

Stationary work zone operations may include paving/chip seal, pavement repair, light standard repair, sign installation, and bridge repair. Work operations may move from location to location within a stationary work zone.

The following TCPs are typical stationary traffic control setups.

TCP 1 Typical-One Lane, Two-Way Traffic Control with Flaggers

For two-lane, two-way roadways with possible intersection.

TCP 2 Typical Pilot Car Operation

Supplements TCP 1 when additional control of traffic is necessary.

TCP 3 Typical Alternating One-Way Traffic with AFAD

This plan provides an example of the signing and device placement for a flagging operation utilizing an AFAD. Consider use of an AFAD for any flagging operation to increase safety.

TCP 4 Typical Alternating One-Way Traffic, Portable Temporary Signal Controlled

This plan provides example of the traffic control signing and device requirements for a portable signal operation. Assistance from the Region Traffic Office and the Region Signal Superintendent may be necessary for signal timing and specific details on the location of the portable signal system. 1,500 feet maximum between signal heads.

TCP 5 Typical Intersection Lane Closure – Three-Lane Roadway

Typical urban location with two lanes and a center turn lane. This plan will most likely need modification or be used as an example in developing a site-specific plan to match actual configurations of lanes and turn pockets.

TCP 6 Typical Intersection Lane Closure- Five-Lane Roadway

Typical urban location with two through lanes each direction and a center turn lane. This plan will most likely need modification or be used as an example in developing a site-specific plan to match actual configurations of lanes and turn pockets.

TCP 7 Typical Roundabout Flagging Operation

This plan is a basic example for the signing and device placement for work in the vicinity of a roundabout. Each roundabout location is unique, and a site-specific traffic control plan should be developed for the work operation.

TCP 8 Short Term Traffic Stop with Flaggers

For two-lane, two-way roadways when short traffic stops are needed.

TCP 19 Outside Lane Closures – Five-Lane Roadway

Typical urban location with two through lanes each direction and a center turn lane. This plan may be used when work will require short traffic stops for both directions of traffic.

TA-46 Work in the Vicinity of a Grade Crossing

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TCP 1 *Typical One-Lane, Two-Way Traffic Control with Flaggers*

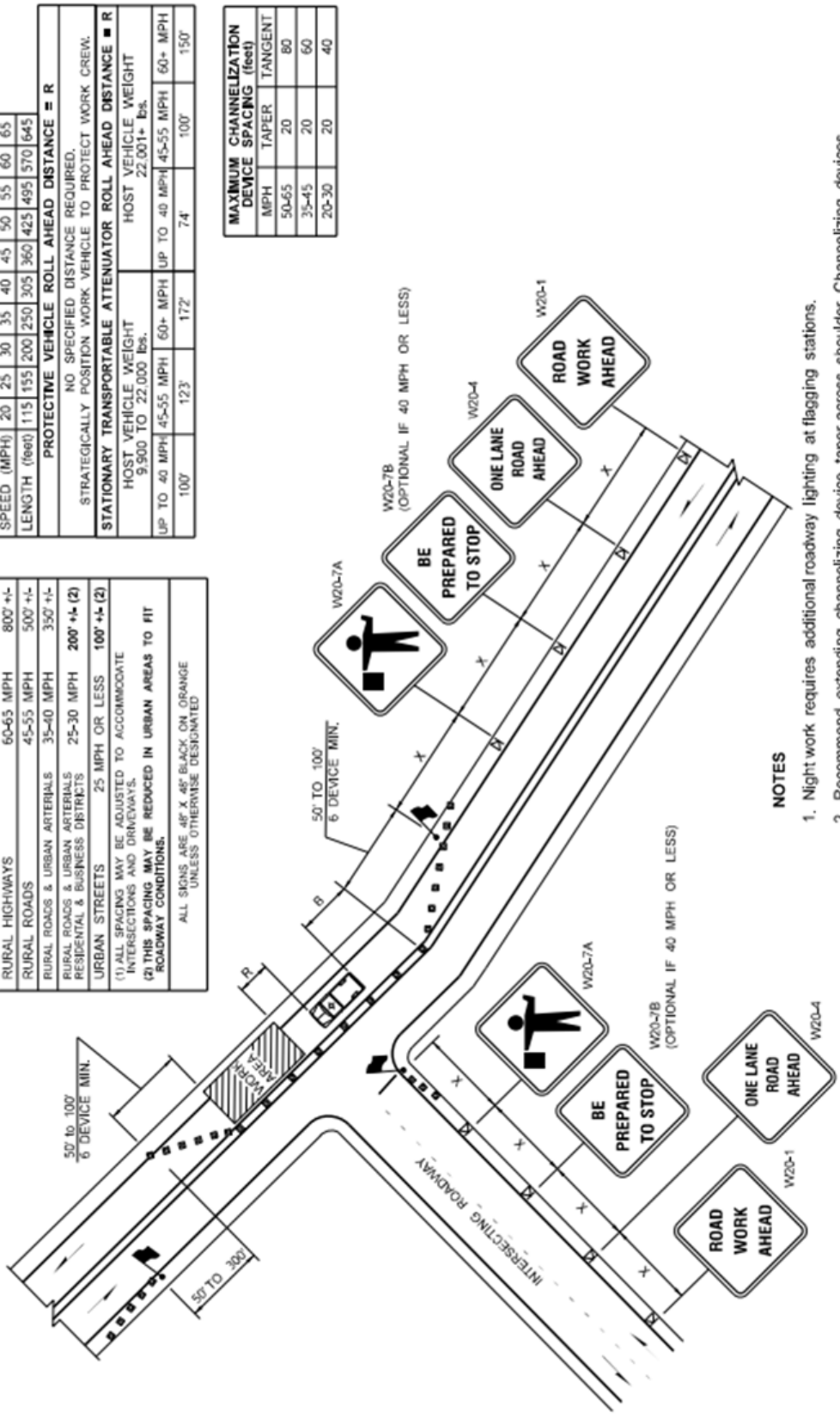
SIGN SPACING = X (1)	
RURAL HIGHWAYS	60-65 MPH 800' +/-
RURAL ROADS	45-55 MPH 500' +/-
RURAL ROADS & URBAN ARTERIALS	35-40 MPH 350' +/-
RURAL ROADS & URBAN ARTERIALS RESIDENTIAL & BUSINESS DISTRICTS	25-30 MPH **200' +/- (2)**
URBAN STREETS	25 MPH OR LESS **100' +/- (2)**
(1) ALL SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERSECTIONS AND DRIVEWAYS. **(2) THIS SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.**	
ALL SIGNS ARE 48" X 48" BLACK ON ORANGE UNLESS OTHERWISE DESIGNATED	

LONGITUDINAL BUFFER SPACE = B										
SPEED (MPH)	20	25	30	35	40	45	50	55	60	65
LENGTH (feet)	115	155	200	250	305	360	425	495	570	645

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R
NO SPECIFIED DISTANCE REQUIRED. STRATEGICALLY POSITION WORK VEHICLE TO PROTECT WORK CREW.

STATIONARY TRANSPORTABLE ATTENUATOR ROLL AHEAD DISTANCE = R					
HOST VEHICLE WEIGHT 9,900 TO 22,000 lbs.			HOST VEHICLE WEIGHT 22,001+ lbs.		
UP TO 40 MPH	45-55 MPH	60+ MPH	UP TO 40 MPH	45-55 MPH	60+ MPH
100'	123'	172'	74'	100'	150'

MAXIMUM CHANNELIZATION DEVICE SPACING (feet)		
MPH	TAPER	TANGENT
50-65	20	80
35-45	20	60
20-30	20	40



NOTES

1. Night work requires additional roadway lighting at flagging stations.
2. Recommend extending channelizing device taper across shoulder. Channelizing devices at flagger stations recommended.
3. Protective Vehicle recommended and may be a work vehicle strategically located to shield the work area.
4. For low-volume roadways with short-duration work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger, positioned to be visible from both directions may be used.
5. Extend the buffer space to locate the flagger station In advance of a curve, If necessary.
6. Flaggers shall provide control and direction for pedestrians.
7. Sign sequence is the same for both directions of travel on the roadway.

LEGEND

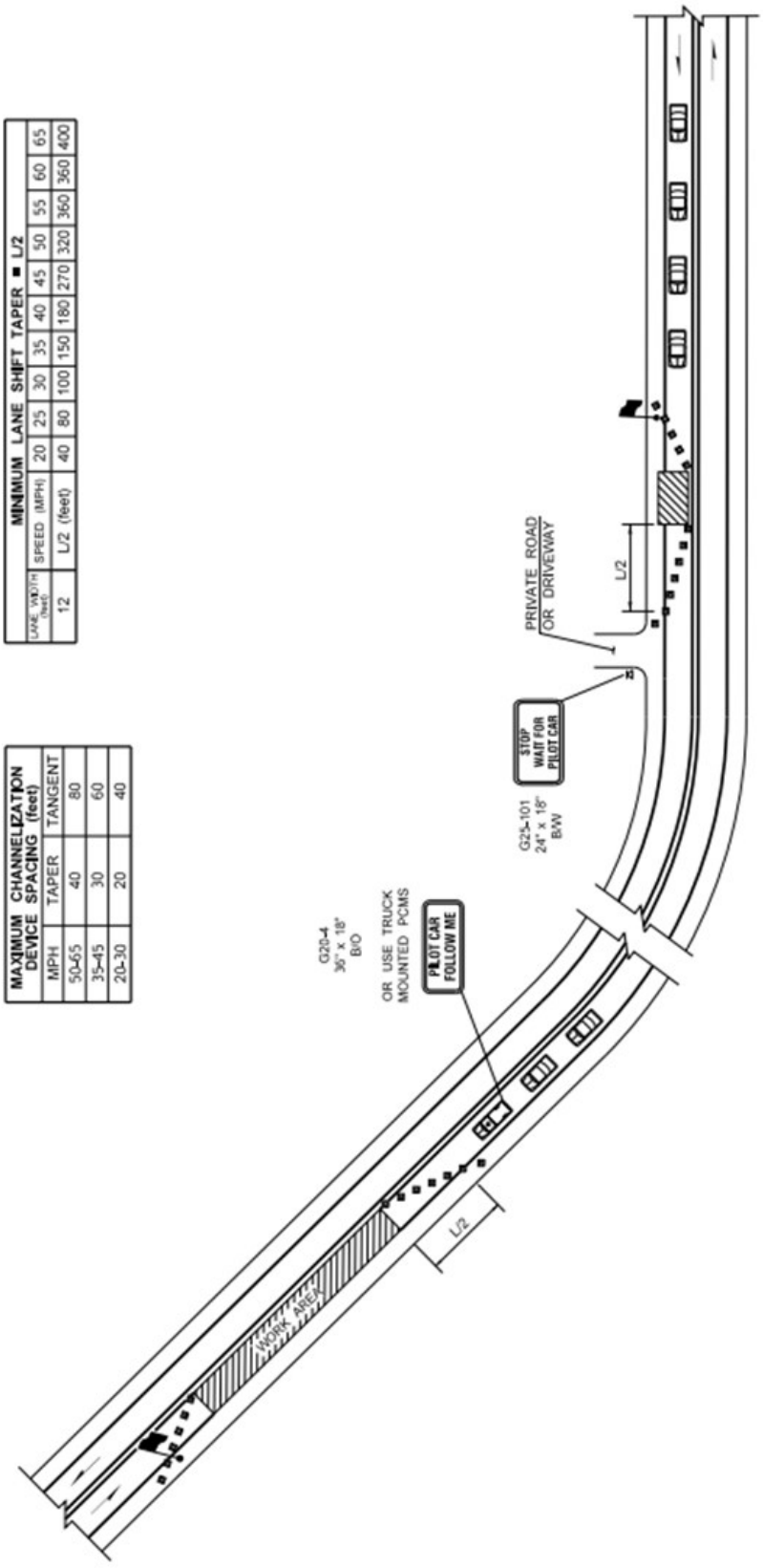
FLAGGING STATION
SIGN LOCATION
CHANNELIZING DEVICES
PROTECTIVE VEHICLE

TYPICAL ONE-LANE, TWO-WAY TRAFFIC CONTROL WITH FLAGGERS
TCP 1

TCP 2 ***Typical Pilot Car Operation***

MINIMUM LANE SHIFT TAPER ■ L/2												
LANE WIDTH (ft)	SPEED (MPH)	20	25	30	35	40	45	50	55	60	65
12	L/2 (feet)	40	80	100	150	180	270	320	360	360	400

MAXIMUM CHANNELIZATION DEVICE SPACING (feet)		
MPH	TAPER	TANGENT
50-65	40	80
35-45	30	60
20-30	20	40



NOTES

1. Refer to sheet TCP 1 for additional signing and flagging details not shown.
2. Channelizing devices are recommended along centerline to separate traffic from work operation. Devices are required at tapers to shift traffic movement between lanes and for protection at all flagging stations.
3. Sign G25-101 is recommended for non-stop sign controlled approaches such as private driveways. This sign can be made of alternative materials other than aluminum.

LEGEND

FLAGGING STATION
SIGN LOCATION
CHANNELIZING DEVICES
PILOT VEHICLE
MOTORIST VEHICLE

TYPICAL PILOT CAR OPERATION
TCP 2

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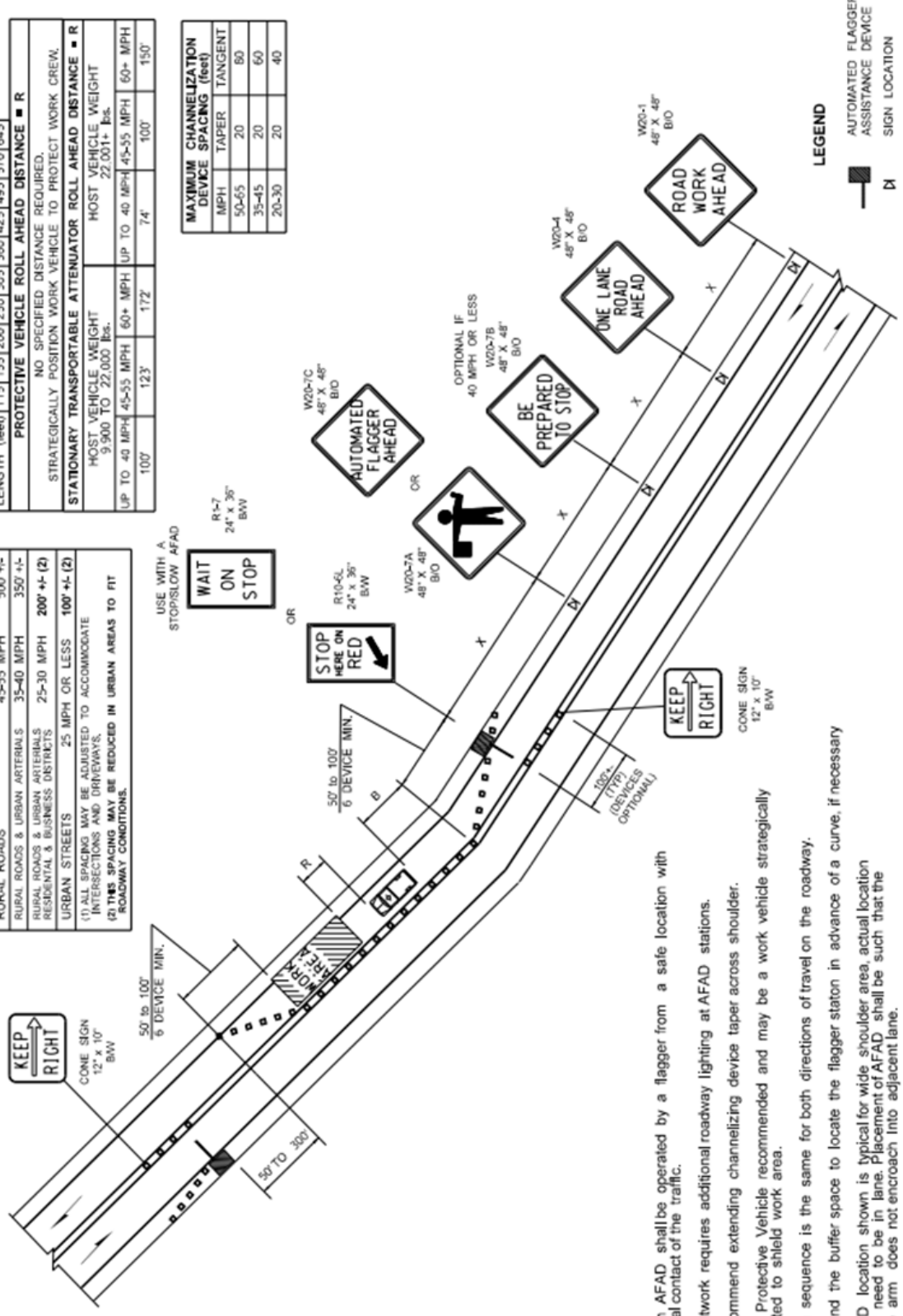
TCP 3 *Typical Alternating One-Way Traffic with Automated Flagger Assistance Devices*



TYPICAL ALTERNATING ONE-WAY TRAFFIC
WITH AUTOMATED FLAGGER ASSISTANCE DEVICES
TCP 3

NOTES

1. Each AFAD shall be operated by a flagger from a safe location with visual contact of the traffic.
2. Nightwork requires additional roadway lighting at AFAD stations.
3. Recommend extending channelizing device taper across shoulder.
4. The Protective Vehicle recommended and may be a work vehicle strategically located to shield work area.
5. Sign sequence is the same for both directions of travel on the roadway.
6. Extend the buffer space to locate the flagger staton in advance of a curve, if necessary
7. AFAD location shown is typical for wide shoulder area, actual location may need to be in lane. Placement of AFAD shall be such that the gate arm does not encroach into adjacent lane.

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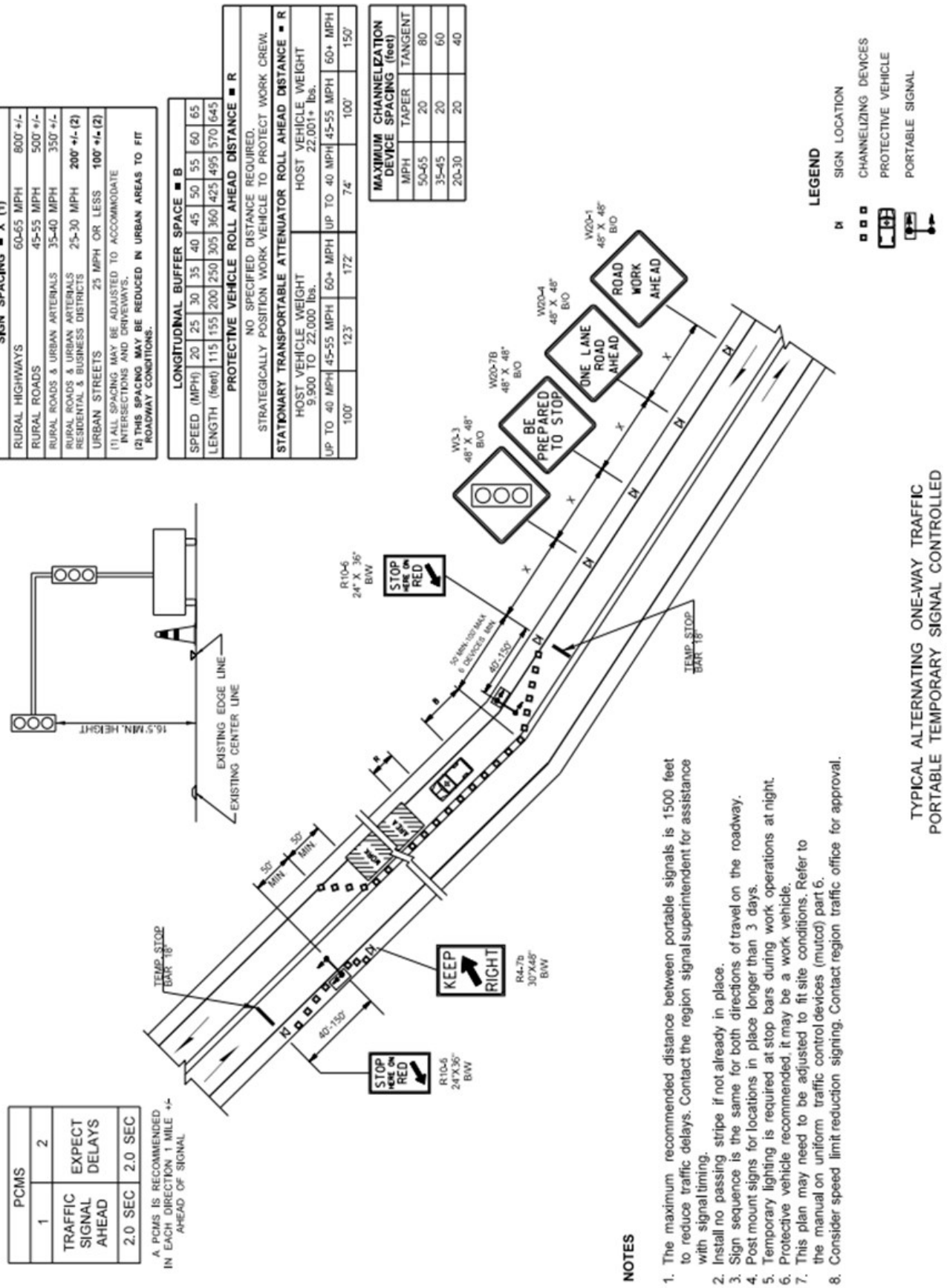
TCP 4 *Typical Alternating One-Way Traffic Portable Temporary Signal Controlled*



TYPICAL ALTERNATING ONE-WAY TRAFFIC
PORTABLE TEMPORARY SIGNAL CONTROLLED
TCP 4

NOTES

1. The maximum recommended distance between portable signals is 1500 feet to reduce traffic delays. Contact the region signal superintendent for assistance with signal timing.
2. Install no passing stripe if not already in place.
3. Sign sequence is the same for both directions of travel on the roadway.
4. Post mount signs for locations in place longer than 3 days.
5. Temporary lighting is required at stop bars during work operations at night.
6. Protective vehicle recommended. it may be a work vehicle.
7. This plan may need to be adjusted to fit site conditions. Refer to the manual on uniform traffic control devices (mutcd) part 6.
8. Consider speed limit reduction signing. Contact region traffic office for approval.

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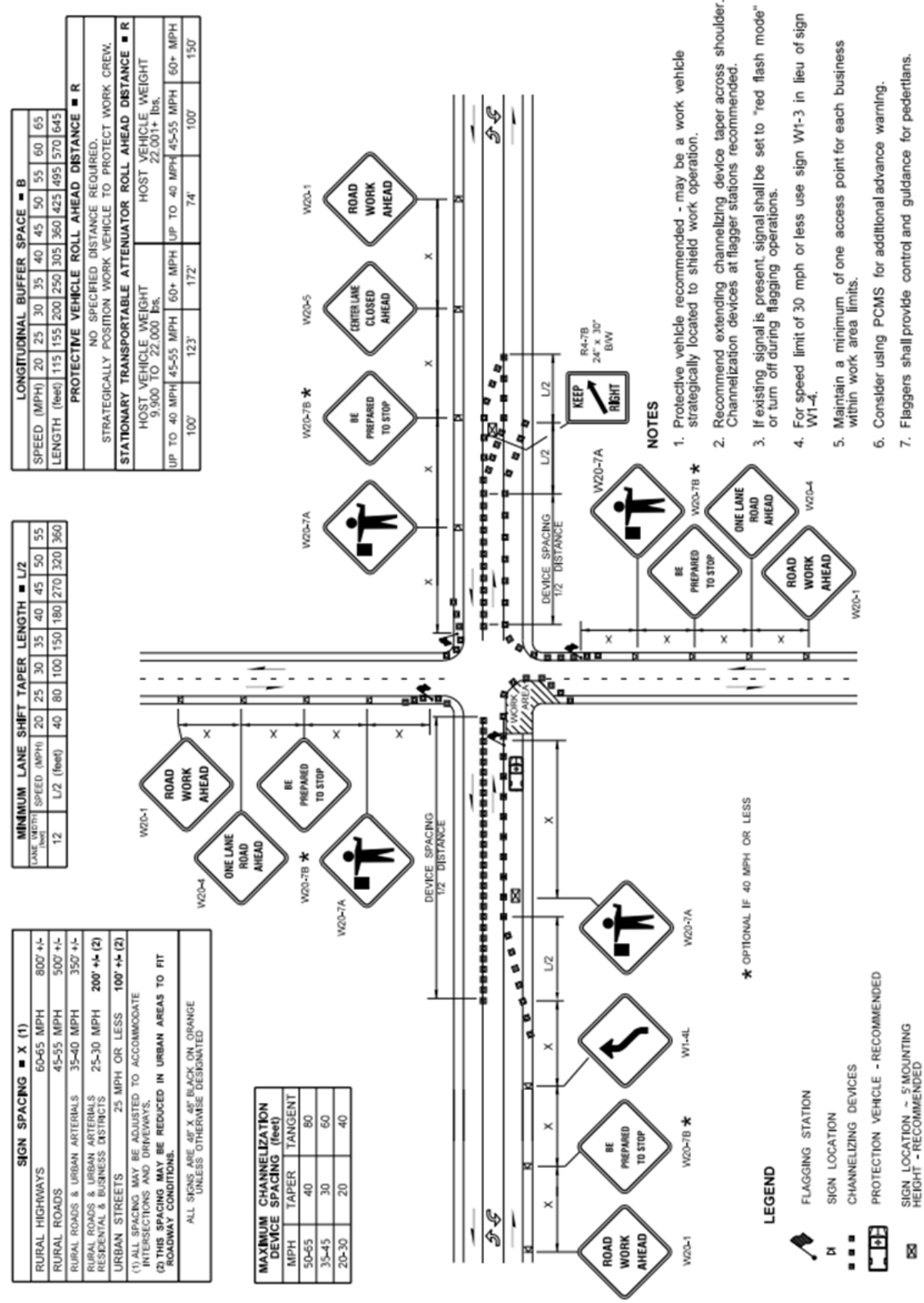
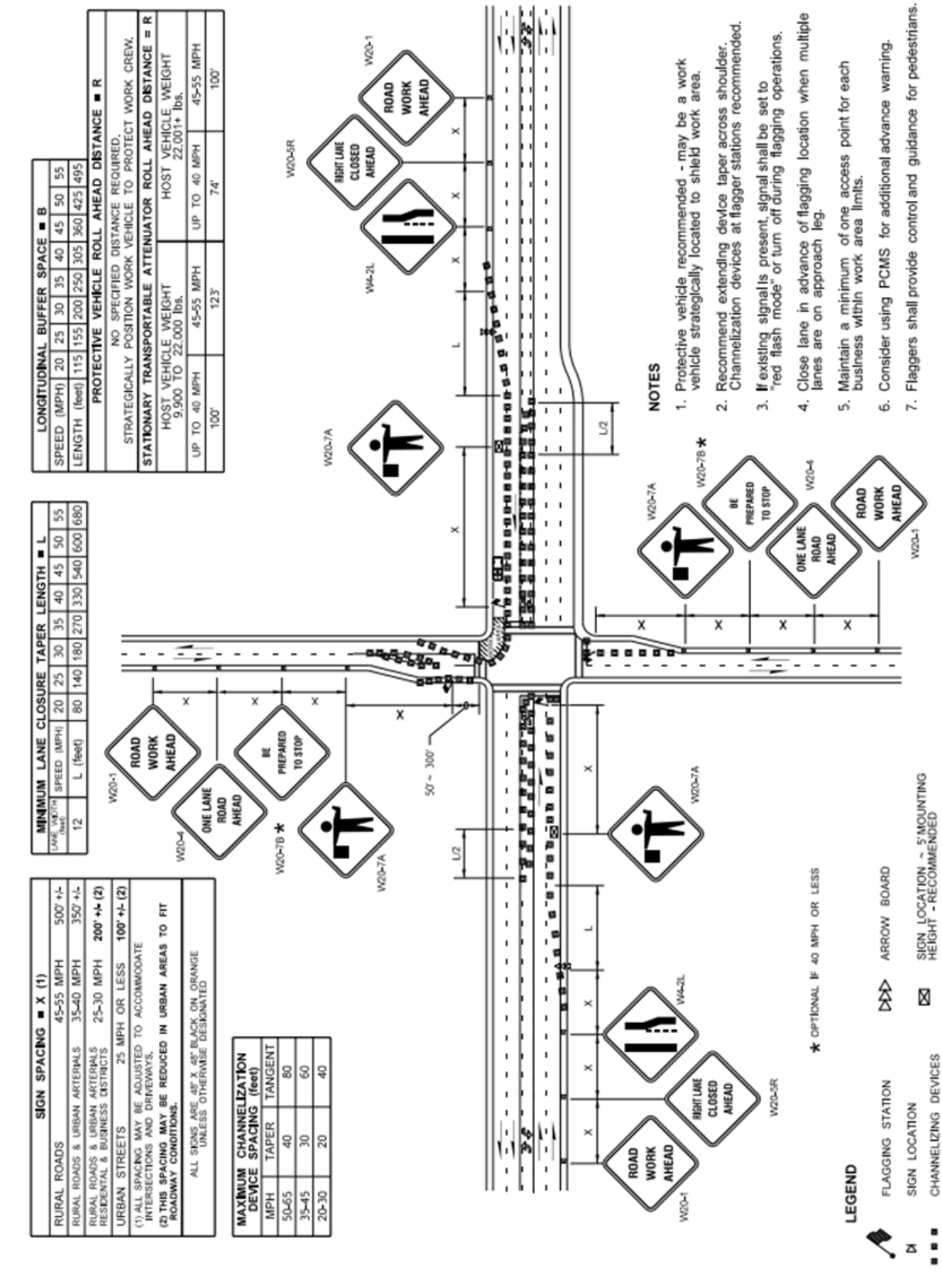
TCP 5 *Typical Intersection lane Closure – Three Lane Roadway*



TYPICAL INTERSECTION LANE CLOSURE ~ THREE LANE ROADWAY
TCP 5

TCP 6 *Typical Intersection Lane Closure – Five Lane Roadway*



TYPICAL INTERSECTION LANE CLOSURE ~ FIVE LANE ROADWAY
TCP 6

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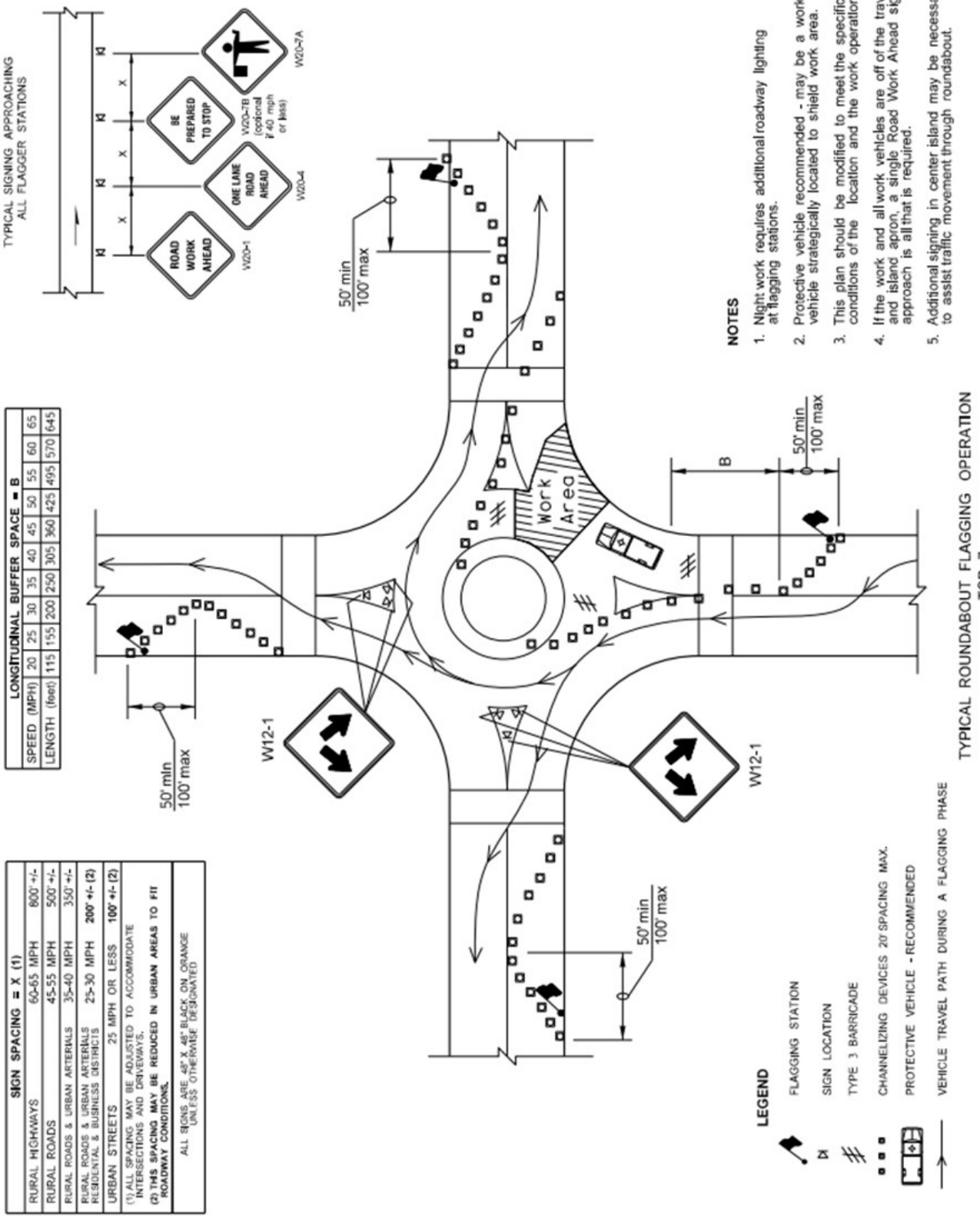
TCP 7 *Typical Roundabout Flagging Operation*



TYPICAL ROUNDABOUT FLAGGING OPERATION
TCP 7

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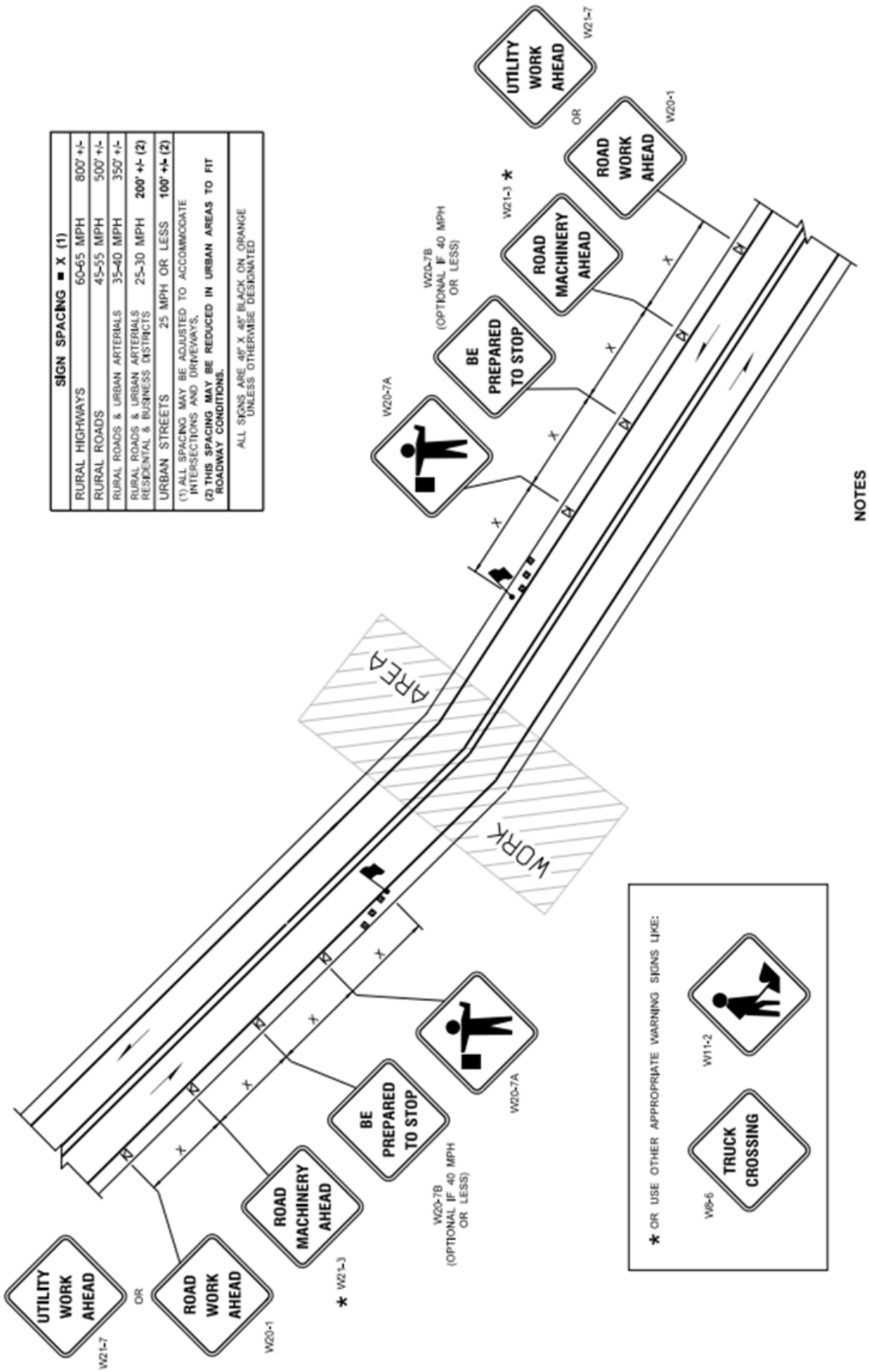
TCP 8 *Typical Traffic Stop with Flaggers*



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TCP 19 *Outside Lane Closures – 5 Lane Roadway*

SIGN SPACING = X (1)	
RURAL ROADS	
45-55 MPH	500' +/-
35-40 MPH	350' +/-
RURAL ROADS & URBAN ARTERIALS	
RESIDENTIAL & BUSINESS DISTRICTS	
25-30 MPH	200' +/- (2)
URBAN STREETS	
25 MPH OR LESS	100' +/- (2)
(1) ALL SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERSECTIONS AND DRIVEWAYS.	
(2) THIS SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.	
ALL SIGNS ARE 48" X 48" BLACK ON ORANGE UNLESS OTHERWISE DESIGNATED	

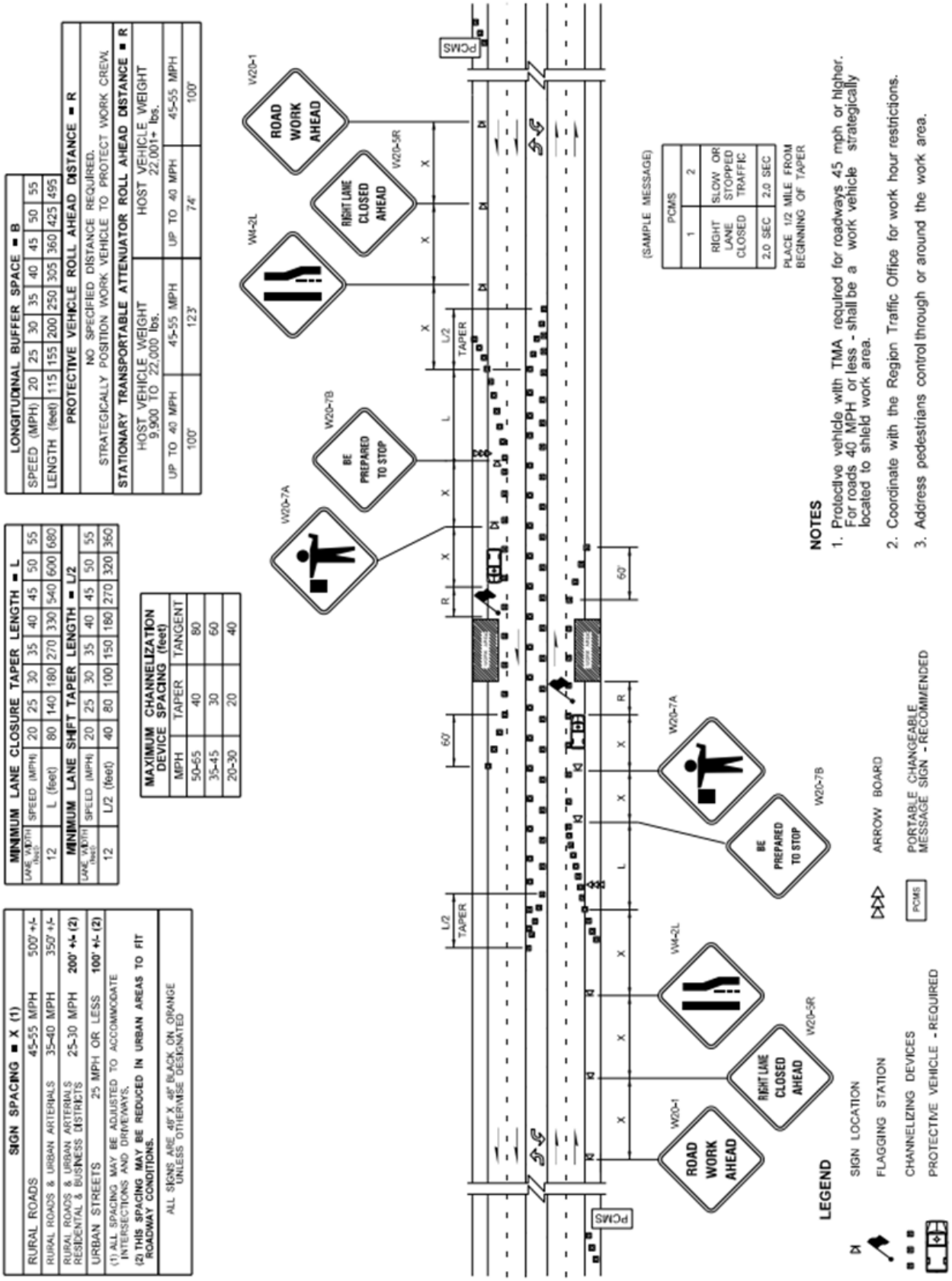
MINIMUM LANE CLOSURE TAPER LENGTH = L									
LANE WIDTH (feet)	SPEED (MPH)	20	25	30	35	40	45	50	55
12	L (feet)	80	140	180	270	330	540	600	680
MINIMUM LANE SHIFT TAPER LENGTH = L/2									
LANE WIDTH (feet)	SPEED (MPH)	20	25	30	35	40	45	50	55
12	L/2 (feet)	40	80	100	150	180	270	320	360

MAXIMUM CHANNELIZATION DEVICE SPACING (feet)		
MPH	TAPER	TANGENT
50-65	40	80
35-45	30	60
20-30	20	40

LONGITUDINAL BUFFER SPACE = B									
SPEED (MPH)	20	25	30	35	40	45	50	55	
LENGTH (feet)	115	155	200	250	305	360	425	495	

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R
NO SPECIFIED DISTANCE REQUIRED. STRATEGICALLY POSITION WORK VEHICLE TO PROTECT WORK CREW.

STATIONARY TRANSPORTABLE ATTENUATOR ROLL AHEAD DISTANCE = R			
HOST VEHICLE WEIGHT 9,900 TO 22,000 lbs.		HOST VEHICLE WEIGHT 22,001+ lbs.	
UP TO 40 MPH	45-55 MPH	UP TO 40 MPH	45-55 MPH
100'	123'	74'	100'



OUTSIDE LANE CLOSURES - FIVE LANE ROADWAY
TCP 19

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Notes for Figure 6H-46—Typical Application 46

Work in the Vicinity of a Grade Crossing

(2009 Edition)

Guidance:

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

Standard:

2. **If the queuing of vehicles across active rail tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the grade crossing to prevent vehicles from stopping within the grade crossing (as described in Note 1), even if automatic warning devices are in place.**

Guidance:

3. *Early coordination with the railroad company or light rail transit agency should occur before work starts.*
4. *In the example depicted, the buffer space of the activity area should be extended upstream of the grade crossing (as shown) so that a queue created by the flagging operation will not extend across the grade crossing.*
5. *The DO NOT STOP ON TRACKS sign should be used on all approaches to a grade crossing within the limits of a TTC zone.*

Option:

6. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
7. A BE PREPARED TO STOP sign may be added to the sign series.

Guidance:

8. *When used, the BE PREPARED TO STOP sign should be located before the Flagger symbol sign.*

Standard:

9. **At night, flagger stations shall be illuminated, except in emergencies.**

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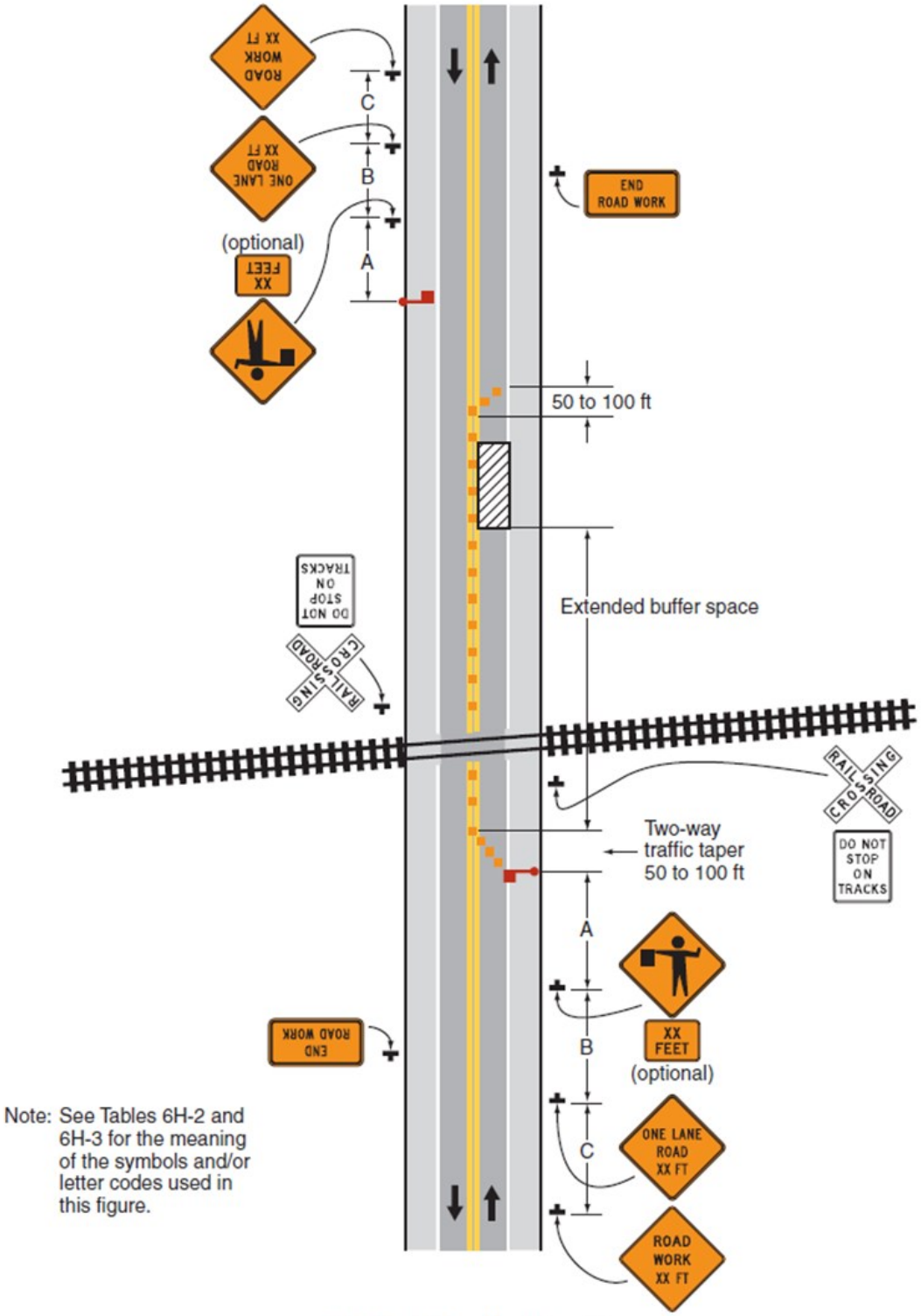
Figure 6H-46. Work in the Vicinity of a Grade Crossing (TA-46)



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

Typical Application 46

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Appendix A: Checklist for Establishing a Temporary Traffic Control Zone

Completed	Item
☐	Determine the duration of work (Stationary, Short-Duration, very short duration or Mobile)
☐	Select an appropriate TCP for the work based on location, duration, type of roadway, motor vehicle traffic volume and speed. (See volume considerations in Section 1.9.10).
☐	Make any necessary modifications to the TCP to address site specific conditions Such as intersections, driveways or sight distance restrictions. Document these modifications.
☐	Make accommodations for pedestrians and ADA needs as appropriate.
☐	Accommodate all travel modes such as bicyclists, transit and school operations as dictated by context and presence of these modes.
☐	Determine work hours avoiding peak traffic times
☐	Check the condition and availability of devices (refer to Quality Guidelines Booklet).
☐	Install devices in the direction of traffic beginning with the first device or sign the driver will see. Follow spacing and layout as per the TCP or modified TCP.
☐	Allow for buffer space free of obstructions.
☐	Conduct a drive through to check for problems. Make adjustments as appropriate. Document these adjustments.
☐	Continuously maintain devices while in place.
☐	Remove devices as soon as the work is completed, beginning with the last device placed.

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Appendix B: Work Zone Information References

FHWA Manual on Uniform Traffic Control Devices (MUTCD)
See Part 6 for Temporary Traffic Control

WA State Adoption and Modifications to the MUTCD
See WAC 468-95-300 to 468-95-317 for modifications to Part 6

WSDOT Standard Specifications Division 1
See sections 1-07.8, 1-07.23 and 1-10

WSDOT Standard Specifications Division 9
See sections 9-35

WSDOT Work Zone Traffic Control Guidelines for Maintenance Operations

DOSH **WAC 296-155-305** Part E: Signaling and Flaggers

ADA Guidelines About PROWAG **(access-board.gov)**

American Traffic Safety Services Association **www.atssa.com**

National Work Zone Safety Information Clearinghouse

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Appendix C: Quick Reference Tables

SIGN SPACING = X (1)		
FREEWAYS & EXPRESSWAYS	50-70 MPH	1500’ +/-
RURAL HIGHWAYS	60-65 MPH	800’ +/-
RURAL ROADS	45-55 MPH	500’ +/-
RURAL ROADS & URBAN ARTERIALS	35-40 MPH	350’ +/-
RURAL ROADS & URBAN ARTERIALS RESIDENTIAL & BUSINESS DISTRICTS	25-30 MPH	**200’ +/- (2)**
URBAN STREETS	25 MPH OR LESS	**100’ +/- (2)**
(1) ALL SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS AND DRIVEWAYS. **(2) THIS SPACING MAY BE REDUCED IN UBRAN AREAS TO FIT ROADWAY CONDITIONS.**		

LONGITUDINAL BUFFER SPACE												
SPEED (MPH)	20	25	30	35	40	45	50	55	60	65	70	75
LENGTH (feet)	115	155	200	250	305	360	425	495	570	645	730	820

STATIONARY TRANSPORTABLE ATTENUATOR ROLL AHEAD DISTANCE					
HOST VEHICLE WEIGHT 9,900 TO 22,000 lbs.			**HOST VEHICLE WEIGHT 22,001+ lbs.**		
UP TO 40 MPH	45-55 MPH	60+ mph	UP TO 40 MPH	45-55 MPH	60+ MPH
100 feet	123 feet	172 feet	74 feet	100 feet	150 feet

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MAXIMUM CHANNELIZATION DEVICE SPACING (feet)		
MPH	**TAPER**	**TANGENT**
50-75	40	80
35-45	30	60
20-30	20	40

TAPER & CHANNELIZATION DEVICE TABLE FOR MERGE, SHIFT, AND SHOULDER CLOSURE TAPERS

(REMEMBER: ADD "1" EXTRA DEVICE TO GET STARTED)

	10 FEET LANE WIDTH				11 FEET LANE WIDTH				12 FEET LANE WIDTH				SHOULDER TAPERS (ASSUMES 10 FT SHOULDER)	
	L		L/2		L		L/2		L		L/2		L/3	
MPH	MERGING	DEVICES	MERGING	DEVICES	MERGING	DEVICES	MERGING	DEVICES	MERGING	DEVICES	MERGING	DEVICES	MERGING	DEVICES
20	70	4	35	2	75	4	40	2	80	4	40	2	25	2
25	105	6	55	3	115	6	60	3	125	7	65	4	35	2
30	150	8	75	4	165	9	85	5	180	9	90	5	50	3
35	205	7	105	4	225	8	115	4	245	9	125	5	70	3
40	270	9	135	5	295	10	150	5	320	11	160	6	90	3
45	450	15	225	8	495	17	250	9	540	18	270	9	150	5
50	500	13	250	7	550	14	275	7	600	15	300	8	170	5
55	550	14	275	7	605	16	305	8	660	17	330	9	185	5
60	600	15	300	8	660	17	330	9	720	18	360	9	200	5
65	650	17	325	9	715	18	370	10	780	20	390	10	220	6
70	700	18	350	9	770	20	385	10	840	21	420	11	235	6
75	750	19	375	10	825	21	420	11	900	23	450	12	250	7

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Appendix D: WAC 296-155-305 Signaling and flaggers.

Definition:

Flagger. A person who provides temporary traffic control.

MUTCD. The Federal Highway Administration's Manual on Uniform Traffic Control as currently modified and adopted by the Washington state department of transportation.

Link: For the current version of the MUTCD, see the department of transportation's website at http://www.wsdot.wa.gov/ and type MUTCD into the search box.

(1) **General requirements for signaling and flaggers.**

You must first apply the requirements in this section. Then you must set up and use temporary traffic controls according to the guidelines and recommendations in Part VI of the MUTCD.

Job site workers with specific traffic control responsibilities must be trained in traffic control techniques, device usage, and placement.

Note: You may purchase copies of the MUTCD by writing:

U.S. Government Printing Office Superintendent of Documents
Mail Stop: SSOP,
Washington D.C. 20402-9328

To view and print a copy of the MUTCD go to http:// www.wsdot.wa.gov/ and type MUTCD into the search box.

(2) **When to use flaggers.**

You must only use flaggers when other reasonable traffic control methods will not adequately control traffic in the work zone.

If signs, signals, and barricades do not provide necessary protection from traffic at work zones and construction sites on or adjacent to a highway or street, then you must use flaggers or other appropriate traffic controls.

(3) **Flagger signaling.**

Flagger signaling must be with sign paddles approved by WSDOT and conform to guidelines and recommendations of MUTCD.

Sign paddles must comply with the requirements of the MUTCD.

When flagging is done during periods of darkness, sign paddles must be retroreflective or illuminated in the same manner as signs.

During emergency situations, red flags, meeting the specifications of the MUTCD, may be used to draw a driver's attention to particularly hazardous conditions. In nonemergency situations, a red flag may be held in a flagger's free hand to supplement the use of a sign paddle.

(4) **Adequate warning of approaching vehicles.** You must:

- Position work zone flaggers so they are not exposed to traffic or equipment approaching them from behind.
- If this is not possible, then the employer, responsible contractor, and/or project owner must develop and use a method to ensure that flaggers have adequate visual warning of traffic and equipment approaching from behind.

Note:

- The following are some optional examples of methods that may be used to adequately warn or protect flaggers: – Mount a mirror on the flagger's hardhat.
- Use an observer.
- Use "jersey" barriers.
- The department recognizes the importance of adequately trained flaggers and supports industry efforts to improve the quality of flagger training. However, training alone is not sufficient to comply with the statutory requirement of revising flagger safety standards to improve options available that ensure flagger safety and that flaggers have adequate visual warning of objects approaching from behind them.

(5) **High-visibility garments for flaggers.**
(a) While flagging during daylight hours, a flagger must at least wear, as an outer garment:

- A high-visibility safety garment designed according to Class 2 specifications in ANSI/ISEA 107-1999, American National Standard for High-Visibility Safety Apparel.
- Consisting of at least 775 square inches of background material that are fluorescent yellow-green, fluorescent orange-red or fluorescent red in color;

AND

- 201 square inches of retroreflective material that encircles the torso and is placed to provide 360 degrees visibility around the flagger.
- A high visibility hard hat that is white, yellow, yellow-green, orange or red in color.

Note: A high-visibility garment meets Class 2 specifications if the garment:
Meets the requirements above;

OR

Has an ANSI "Class 2" label.

Definition:

Hours of darkness. 1/2 hour before sunset to one-half hour after sunrise.

(b) While flagging during hours of darkness, a flagger must at least wear, as an outer garment:

A high-visibility safety garment designed according to Class 2 specifications in ANSI/ISEA 107-1999. Consisting of at least 775 square inches of background material that are fluorescent yellow -green, fluorescent orange-red or fluorescent red in color;

AND

201 square inches of retroreflective material that encircles the torso and is placed to provide 360 degrees visibility around the flagger.

White coveralls, or other coveralls or trousers that have retro-reflective banding on the legs designed according to ANSI/ISEA 107-1999 standards.

When snow or fog limit visibility, pants, coveralls, or rain gear, meeting these additional

requirements must be worn:
-In a highly visible color;

–With retroreflective banding on the legs;

–Designed according to ANSI/ISEA 107-1999.

- A high-visibility hard hat:
- Marked with at least 12 square inches of retroreflective mate-rial applied to provide 360 degrees of visibility.

Note: ANSI/ISEA 107-1999 is available by:

Purchasing copies of ANSI/ISEA 107-1999 by writing:

American National Standards Institute
11 West 42nd Street
New York, NY 10036

OR

Contacting the ANSI website at
http:web.ansi.org/.

OR

- Reading a copy of ANSI/ISEA 107-1999 at any Washington state library.

(6) **Flagger training.** You must make sure that: (a) Each flagger has in their possession:

- A valid Washington traffic control flagger card; or
- A valid flagger card from a state such as:
- Oregon;
- Idaho;
- Montana;

OR

– Other states having a flagger training reciprocity agreement with Washington.

(b) The flagger card shows the following: • Verification that the flagger training required is completed;

- Date the flagger received their flagger training;
- Name of the instructor providing the flagger training;
- Name of the state that issued the flagger card;
- The card's expiration date, not to exceed 3 years from the date of issuance;

AND

- The flagger's picture or a statement that says "valid with photo ID."

(c) Flagger training is based upon the MUTCD.

Exemption: Personnel that have not completed a flagger-training course may be assigned duties

as flaggers only during emergencies. Emergency assignments are temporary and last only until a certified flagger can be put into the position.

Definition: Emergency. An unforeseen occurrence endangering life, limb, or property.

(7) **Flagger orientation and traffic control plan.**

(a) The employer, responsible contractor or project owner must conduct an orientation that familiarizes the flagger with the job site. This requirement applies each time the flagger is assigned to a new project or when job site conditions change significantly.

The orientation must include, but is not limited to:

- The flagger's role and location on the job site;
- Motor vehicle and equipment in operation at the site;
- Job site traffic patterns;
- Communications and signals to be used between flaggers and equipment operators;
- On-foot escape route;

AND

• Other hazards specific to the job site.

(b) If flaggers are used on a job that will last more than one day, then the employer, responsible contractor and/or project owner must keep on-site, a current site specific traffic control plan. The purpose of this plan is to help move traffic through or around the construction zone in a way that protects the safety of the traveling public, pedestrians and workers.

The plan must include, but is not limited to, the following items when they are appropriate:

- Sign use and placement;
- Application and removal of pavement markings;
- Construction;
- Scheduling;
- Methods and devices for delineation and channelization;
- Placement and maintenance of devices;
- Placement of flaggers;
- Roadway lighting;
- Traffic regulations;

AND

• Surveillance and inspection.

(8) **Advance warning signs.**

(a) You must provide the following on all flagging operations:

- A 3 sign advance warning sequence on all roadways with a speed limit below 45 mph.
- A 4 sign advance warning sequence on all roadways with a 45 mph or higher speed limit.

Warning signs must reflect the actual condition of the work zone. When not in use, warning signs must either be taken down or covered. You must make sure to follow Table 1 for spacing of advance warning sign placement.

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Table 1. Advanced Warning Sign Spacing

Road Type	Speed	Distances Between Advance Warning Signs*			
		A**	B**	C**	D**
Freeways & Expressways	70 55	1,500 ft.+/- or per the MUTCD.	1,500 ft.+/- or per the MUTCD.	1,500 ft.+/- or per the MUTCD.	1,500 ft.+/- or per the MUTCD.
Rural Highways	65 60	800 ft.+/-	800 ft.+/-	800 ft.+/-	800 ft.+/-
Rural Roads	55 45	500 ft.+/-	500 ft.+/-	500 ft.+/-	500 ft.+/-
Rural Roads and Urban Arterials	40 35	350 ft.+/-	350 ft.+/-	350 ft.+/-	N/A
Rural Roads, Urban Streets, Residential Business Districts	30 25	200 ft.***	200 ft.***	200 ft.***	N/A
Urban Streets	25 or less	100 ft.***	100 ft.***	100 ft.***	N/A

*All spacing may be adjusted to accommodate interchange ramps, at-grade intersections, and driveways.

**This refers to the distance between advance warning signs. See Figure 1, Typical Lane Closure on Two-Lane Road. This situation is typical for roadways with speed limits less than 45 mph.

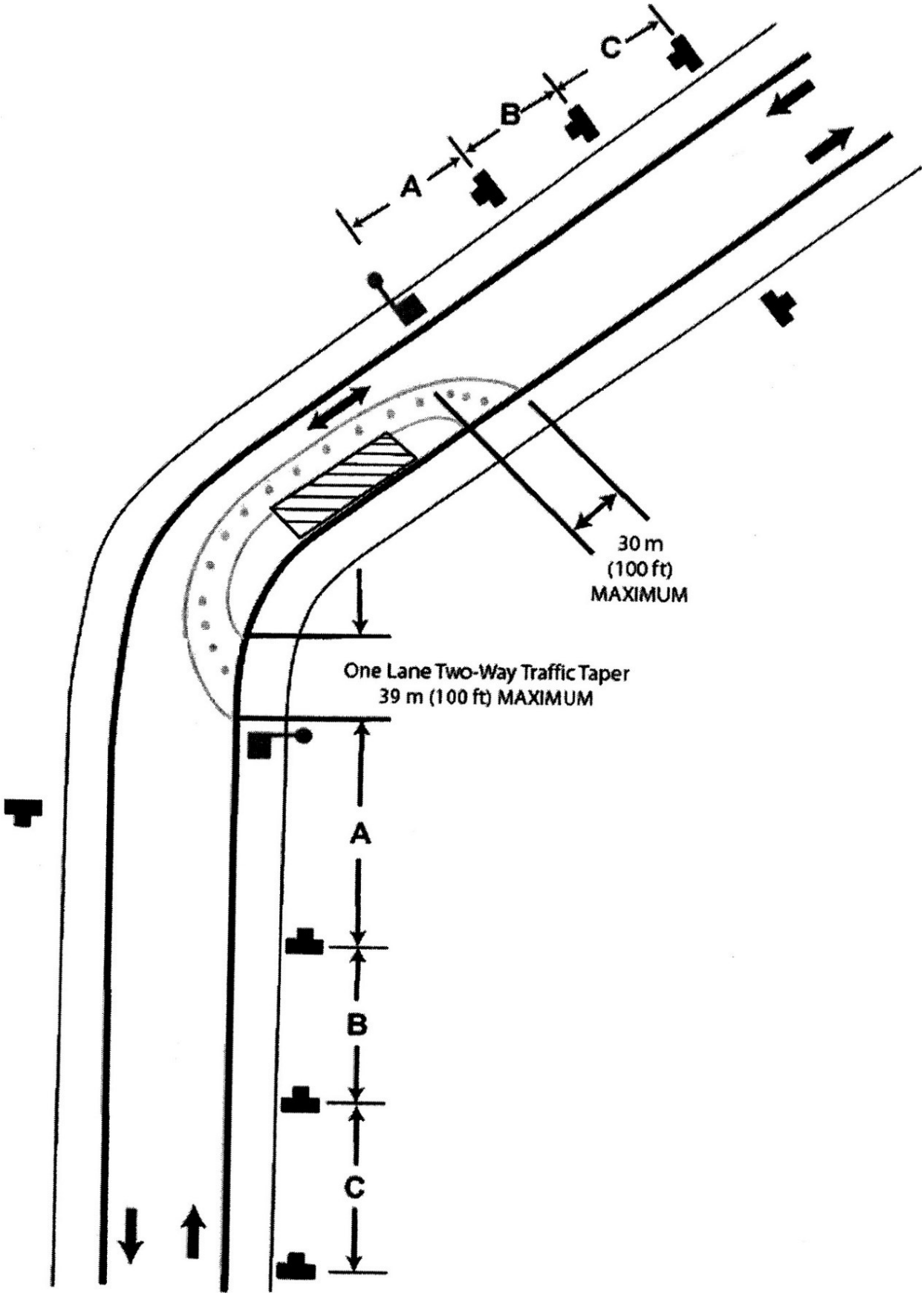
***This spacing may be reduced in urban areas to fit roadway conditions.

Exemption: In a mobile flagging operation, as defined by the MUTCD when the flagger is moving with the operation, the "flagger ahead (symbol or text)" sign must be:

- Within 1,500 feet of the flagger;

AND

- The flagger station must be seen from the sign.
- If terrain does not allow a motorist to see the flagger from the "flagger ahead" sign, the distance between the flagger and the sign must be shortened to allow visual contact, but in no case can the distance be less than the distance specified in Table 1, Advanced Warning Sign Spacing.


C
B
A
30 m
(100 ft)
MAXIMUM
One Lane Two-Way Traffic Taper
39 m (100 ft) MAXIMUM
A
B
C

(9) **Providing a safe job site for flaggers.** Employers, responsible contractors and/or project owners must make sure that:

(a) Flagger stations are located far enough in advance of the work space so that the approaching road users will have sufficient distance to stop before entering the work space. Follow Table 2 for the distance of the flagger workstation in advance of the work space.

Table 2. Distance of Flagger Station in Advance of the Work Space

Speed* (mph)	Distance (ft)**
20	35
25	55
30	85
35	120
40	170
45	220
50	280
55	335
60	415
65	485

* Posted speed, off-peak 85th-percentile speed prior to work starting or the anticipated operating speed.

** This spacing may be reduced to fit roadway and worksite conditions. Distances greater than those listed in the table are acceptable.

(b) Flaggers stand either on the shoulder adjacent to the road user being controlled or in the closed lane prior to stopping road users. A flagger must only stand in the lane being used by moving road users after road users have stopped.

Definition:

Road user. A vehicle operator, bicyclist, or pedestrian within a public roadway, including workers in temporary traffic control zones.

(c)Flagger workstations are illuminated during hours of darkness by floodlights that do not create glare that poses a hazard for drivers.

Note: To identify potential glare, observe the lighted area from various directions and angles on the main roadway after initial floodlight setup.

Exemption: Emergency situations are exempt from these illumination requirements. For the purpose of this rule, ***emergency*** means an unforeseen occurrence endangering life, limb, or property.

(d) Flaggers are not assigned other duties while engaged in flagging activities.

(e) Flaggers do not use devices that may distract the flagger's vision, hearing, or attention.

- Examples of these devices include cell phones, pagers, radios, and headphones.
- Devices such as two-way radios used for communications between flaggers to direct traffic or

ensure flagger safety are acceptable.

(f) Flaggers receive a rest period of at least 10 minutes, on the employer's time, for each 4 hours of working time.

- Rest periods must be scheduled as near as possible to the mid-point of the work period.
- A flagger must not be allowed to work more than 3 hours without a rest period.

Exemption: Scheduled rest periods are not required where the nature of the work allows a flagger to take intermittent rest period's equivalent to 10 minutes for each 4 hours worked.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. WSR 16-09-085, § 296-155-305, filed 4/19/16, effective 5/20/16. Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060, and 29 C.F.R. 1926.201. WSR 13-24-099, § 296-155-305, filed 12/3/13, effective 1/6/14. Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050,

49.17.060. WSR 07-03-163, § 296-155-305, filed 1/24/07, effective 4/1/07; WSR 06-05-027, § 296-155-305, filed 2/7/06, effective 4/1/06; WSR 04-24-089, § 296-155-305, filed 12/1/04, effective 1/1/05; WSR 03-06-075, § 296-155-305, filed 3/4/03, effective 8/1/03. Statutory Authority: RCW 49.17.010, [49.17].040, [49.17].050, 2000 c 239, and chapter 34.05 RCW. WSR 01-04-015, § 296-155-305, filed 1/26/01, effective 2/28/01. Statutory Authority: Chapter 49.17 RCW. WSR 93-19-142 (Order 93-04), § 296-155-305, filed 9/22/93, effective 11/1/93; WSR 93-01-067 (Order 92-15), § 296-155-305, filed 12/11/92, effective 1/15/93; WSR 89-11-035 (Order 89-03), § 296-155-305, filed 5/15/89, effective 6/30/89. Statutory Authority: RCW 49.17.040 and 49.17.050. WSR 86-03-074 (Order 86-14), § 296-155-305, filed 1/21/86; Order 76-6,

§ 296-155-305, filed 3/1/76; Order 74-26, § 296-155-305, filed 5/7/74, effective 6/6/74.]

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Appendix E Equipment Movement

Road construction routinely involves work within close proximity of construction vehicles and motor vehicle traffic. Flaggers and other workers on foot are exposed to the risk of being struck by traffic vehicles or construction equipment if they are not visible to motorists or equipment operators. Workers who operate construction vehicles or equipment risk injury due to collision, overturn, or being caught in running equipment.

Equipment Movement Safety Guidelines

- If manually guiding the movement of equipment, ensure you make eye contact and acknowledge the operator can always visibly see you and maintain communication with the driver.
- During the movement of equipment, the manually guiding personnel must be able to see the entire backing zone of vehicles.
- Alert personnel of equipment and to clear the path for the equipment's movement.
- Continuously provide direction to the driver until the operator reaches the destination.

The National Institute for Occupational Safety and Health (NIOSH) website contains diagrams of several different construction vehicles and their associated blind areas.

CDC/NIOSH Website: **NIOSH Construction Equipment Visibility Diagrams**

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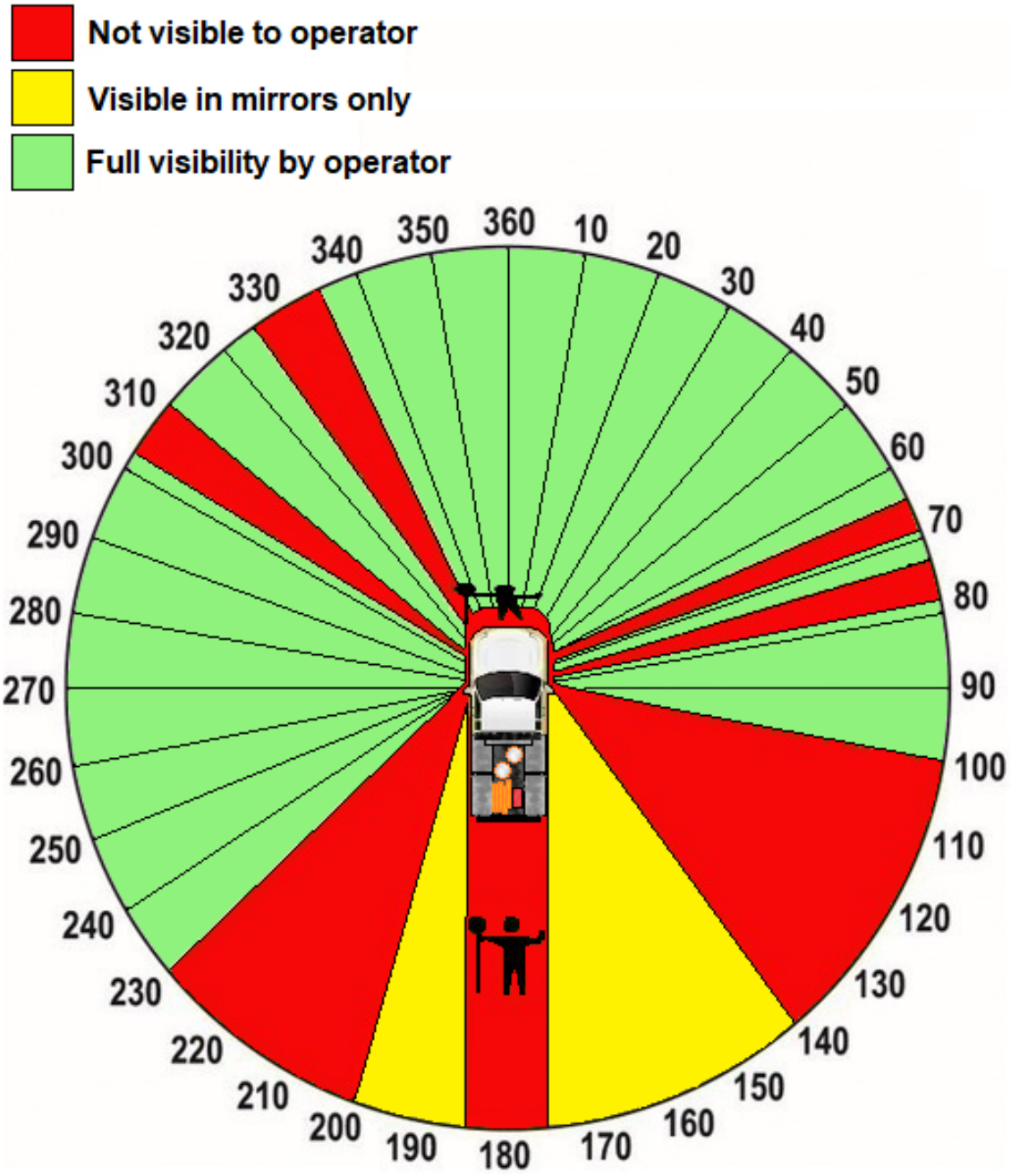
Vehicle Blind Spot Diagram



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TEMPORARY TRAFFIC CONTROL & FLAGGING OPERATIONS MANUAL

Developed by the **Washington State Department of Transportation (WSDOT)** in conjunction with the **Washington State Department of Labor and Industries (LNI)**, and **Temporary Traffic Control Oversight Committee (TTOC)**, this manual is a resource for traffic management within Washington State. Tailored to state regulations, it offers practical insights and expert guidance for professionals in the field. From basic principles to advanced techniques, it equips users with the tools needed for safe, efficient, and compliant traffic control.

Download at esc.org/wa-state-flagger-manual