Work Zone Traffic Control Guidelines

May 2000
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Washington State Department of Transportation
Field Operations Service Support Center

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Forward

While this booklet provides interpretive guidance, it does not change the intent of Part VI of the Manual on Uniform Traffic Control Devices (MUTCD). The traffic control devices and distances shown in this booklet reflect desired minimums for WSDOT use.

Good traffic control is essential, not only for the safety of the traveling public, but also for WSDOT employees and those construction workers whose jobs often require them to be in close proximity to high speed traffic. The traffic control guidelines in this booklet are intended to reduce field personnel's exposure to the hazards of traffic and offer the driving public consistent and positive guidance through work zone areas. Safety of crews and the driving public must be an integral part of WSDOT field operations.

We emphasize that these are guidelines and not absolute standards. The traffic control plans in this booklet are to be used along with sound judgment. Proper planning, a good safety conscious attitude and full participation from the persons involved in the work zone are all prerequisites to good traffic control. Aspects of the roadway environment such as weather, time of day, traffic volumes, traffic speed, roadway geometry, roadside conditions, and your inventory of traffic control devices should all be considered when implementing the guidelines of this booklet. If you have any questions or needs not addressed here, please consult your Regional Traffic Office staff.

Be assured that the Work Zone Safety Task Force and I are committed to securing increased funding for better and safer work zones through the legislative process to meet your workforce and equipment needs.

John Conrad

Assistant Secretary
for Field Operations

Comment Request Form

From: _____ Date: _____
_____ Scan: _____
_____ Phone: _____

To: State Traffic Engineer
724 Quince Street SE, Capital View II Building
PO Box 47344
Olympia, WA 98504-7344

Subject: *Work Zone Traffic Control Guidelines* Comment

☐ Addition ☐ Correction
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Introduction

The primary function of work zone traffic control is to allow vehicles and pedestrians to move safely and easily through or around work areas. Effective temporary traffic control enhances traffic safety and efficiency. Drivers and pedestrians need to be guided in a clear and positive manner while approaching and traversing temporary traffic control zones.

The traffic control plans contained in this booklet are furnished as a guide to be used along with good judgment. Minor modifications may be made, as necessary, to accommodate site conditions; however, a plan's original intent must be maintained. An alternate plan should be considered if substantial revisions are needed. Consult the Region Traffic Office Staff for additional guidance.

No single set of traffic control plans can satisfy all conditions for all work zones. The Manual on Uniform Traffic Control Devices (MUTCD) was adopted by WSDOT as the legal standard. Principles set forth in Part VI of the MUTCD titled "Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility and Incident Management Operations" are represented in this booklet to provide traffic control guidance for common work operations.

Instructions

Procedures

1. Provide substantial protection and minimize worker exposure to traffic by applying barriers and devices in practical ways. Long term projects may warrant the use of concrete barrier while short term projects can be better served by a truck mounted attenuator (TMA). Always consider the use of a protective barrier.

2. Prior to the beginning of work operations, evaluate all aspects of the work area, including sight distance, traffic speed, volume, road approaches and the type of work activity, before deciding on a traffic control plan.

3. After the traffic control plan is implemented, the supervisor (i.e. the person(s) supervising the actual work task(s) for which the TCP was implemented – e.g. Maintenance Lead Tech, Construction Project TCS(s) – both WSDOT and contractor, survey party chief) should drive through the work area, at the anticipated speed of the motorists, to determine the effectiveness of the plan. Additional reviews throughout the day are recommended to insure that traffic control devices remain in place.

4. Traffic control devices must be moved ahead whenever work advances to more than 2 miles from the advance warning signs. **In a mobile flagging operation the "flagger ahead (symbol or text message)" sign is recommended to be within 1,000 feet of the flagger, any time a flagger is deployed.**

5. Plan ahead for manpower, equipment, and materials, (such as signs, channelization devices, pavement marking materials, etc.) needed for traffic control.

6. The distances shown on the traffic control plans are desirable minimums. Device spacing, buffer space, and sign spacing might require adjustments to provide for site conditions. Reductions in taper length distances are not recommended. Reductions in roll-ahead distances are allowed, see Equipment, 6. Truck Mounted Attenuators page 5.

7. The Washington State Patrol is available to assist WSDOT by enforcing excessive speed and drinking driver laws in critical work zone traffic control situations. These may include nighttime lane closures on high volume/high speed freeways or road closures. Contact the Region Traffic Office Staff for specific information regarding procedures to utilize the WSP.

8. Traffic control devices are used to visually guide drivers through work zones. Signing, channelizing devices, arrow boards and warning beacons all display a message to the driver. Work zone credibility is established through the proper use of these devices to send correct messages to drivers. Poor work zone credibility has a direct, negative, impact on work zone safety by causing driver confusion, frustration and disrespect which results in a high potential for accidents.

9. During paving operations, temporary pavement markings shall be maintained throughout the project. Temporary pavement markings shall be installed on the roadway that was paved that day. Temporary pavement markings shall be in accordance TCD1(Temporary Pavement Marking Details), on page 45.

Personal Attributes

1. **Awareness:**
   Routinely working near traffic for extended periods of time can cause workers to become complacent to the danger around them. Therefore, it is necessary to continually remind ourselves and others of the dangers to which we are exposed.

2. **Alertness:**
   There is no place on a *"traffic exposed"* work crew for a daydreamer or distracter. Each individual, for their own protection and that of the crew, must stay constantly alert and watchful.

3. **Attitude:**
   A positive, safety-conscious, attitude on the part of each crew member will contribute greatly to the overall safety of crew operations.

Equipment

1. **<u>Personal Protective Wear:</u>**

   The wearing of soft caps is permitted, except when required by state safety regulations WAC 296-155-205, WAC 296-155-305 and WAC 296-24-084 and when working on or around the following:

- Asphalt Plant, Crushers, Blasting Area, Asphalt grinding operations.
- Construction of bridges, structures, retaining walls, etc.
- Overhead work such as working in a trench, rock-fall areas, sign installation, installing poles, work under bridges, electrical conductors, etc.
- Working near operating equipment with arms, booms, buckets, etc.
- Work around cranes, pile driving, drilling.
- During work as a flagger.
- Brush cutter work, danger tree work, other logging operations.
- Any designated hard hat area.

Supervisors have the authority to require employees to wear hard hats for other activities where there is a danger from impact and/or penetration of falling and flying objects. Employees must have a hard hat on site and readily available for use when work conditions require their use.

Traffic Vest, Coveralls, Rain Gear and T-Shirts
While working on foot in a highway right of way (fence line to fence line) all WSDOT workers must:

- Wear reflective vests, except that during daylight hours, clothing of orange, yellow, strong yellow green or fluorescent versions of these colors may be worn in lieu of reflective vests. Flaggers must wear reflective vests and hard hats at all times.
- During hours of darkness, wear vests, white coveralls or either high visibility reflective strong yellow green pants with red-orange strip or red-orange pants with lime yellow strip.
- When rain gear is worn during the hours of darkness, it shall be white or yellow.
- The reflective vests shall always be the outermost garment.

Exceptions to these requirements are: (1) when personnel are out of view of, or not exposed to, traffic, (2) when personnel are inside a vehicle, or (3) where it is obvious that such apparel is not needed for employee safety from traffic.

The standard WSDOT vest is either high visibility strong yellow green in base color with orange-red trim or 3M silver Scotchlite reflective material (or equivalent), **or** a red-orange base color with strong yellow green trim and either 3M silver Scotchlite or 3M type, 2" wide, 6187 (or equivalent) strong yellow green reflective strip.

A WSDOT specified, high visibility, T-shirt may be purchased by WSDOT employees and worn in lieu of the WSDOT Safety Vest by employees during daylight hours and when not working as a flagger. T-shirts shall not have any words or "ads" affixed to them. The WSDOT T-shirt standard requires a crew neck, base color orange, minimum 2 each 2" horizontal yellow bars on front and back with at least 2" apart vertically. The supervisor and/or Region Safety Officer shall have final approval authority over both the T-shirt itself and its use.

2. **Traffic Control Crash Test Requirements:**

   After October 1, 2000, all new purchases of Category II traffic control devices (portable sign stands with signs, type 1, 2, & 3 barricades, vertical panels, intrusion alarms, and other work zone devices under 100 lbs.) shall be compliant with the federal NCHRP 350 crash test requirements. WSDOT will phase out existing devices as they complete their normal service life. All Category II devices will be "350" compliant by December 31, 2007.

3. **Condition and Care of Equipment:**

   All personal equipment and traffic control devices shall be kept clean to provide protection for the crew through better visibility to the motorist.

4. **Signs:**

   Old signs that are no longer reflective (visible and legible at night) or in poor condition are to be replaced. Standard 48" x 48" temporary warning signs are diamond shape with black letters or symbols on an orange background. Some work areas might require the use of special or regulatory signs. Roll-up reflective signs can also be used. Sign supports must be in good condition and be capable of withstanding normal wind stresses along the highway.

5. **Vehicles:**

   - **Work Zone Vehicle** - All vehicles used within the work zone must be equipped with an approved flashing warning beacon. 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 when the workers are at an unexpected location. Workers should be in close proximity to work vehicles, on the same side of the roadway.

   - **Protective Vehicle** - Usually a stationary vehicle (in stationary work zones) strategically placed in advance of the work area, between the buffer space and the roll ahead space, to protect workers from oncoming traffic. The use of a Truck Mounted Attenuator (TMA) on this vehicle is recommended (see the chart on

page 6). Allow for roll ahead distance resulting from an impact. Refer to the data block on the TCPs for specific information. The Protective vehicle can be a work vehicle if no other vehicles are available.

- **Shadow Vehicle** - Very similar to the protective vehicle but usually a moving vehicle (mobile work zones). All of the above guidelines for the protective vehicle apply to the shadow vehicle. A sequential arrow panel or truck mounted Portable Changeable Message Sign(PCMS) may also be used on the shadow vehicle.

6. **Truck Mounted Attenuators (TMA):**

   Recommended for high speed work zone protection. If a TMA is not available, the use of a protective or shadow vehicle is still highly recommended.

   Consider the following for determining TMA use:

- **Speed of Traffic** - Higher operating speeds leave less response time and impacts generally result in more severe injuries and damage. Therefore, the higher the operating speed the more probability that a TMA is necessary.

- **Type of activity** - Mobile, intermittent or stationary.

- **Duration of project.**

- **Roadway environment** - Access controlled vs. non-access controlled, urban vs. rural, and roadway geometrics. Access controlled facilities frequently give drivers a false sense of security since interruptions are not expected. Therefore, activities on freeways may be more susceptible to incidents than are activities on non-access controlled facilities, where drivers are generally more alert.

- **Traffic volumes** - More traffic means more worker exposure.

- **Exposure to special hazards** - Operations involving personnel on foot or located in exposed positions (for example, on the platform of a pickup truck placing cones or in a lift-bucket performing overhead operations) are particularly susceptible to high severity incidents.

- **Location of work area** - Locations of primary concern are those within the traveled lanes or within frequently used, all-weather, shoulders. Activities taking place within the traveled lanes are more likely to become involved in an incident than are shoulder activities.

- **Roll Ahead Distance** - The roll ahead distances shown in the BUFFER DATA blocks on the TCPs are conservative values, based upon a 24,000 lb. vehicle impacting the TMA. These distances may be reduced, after consideration of all the above factors, including the mix of vehicle type traveling past the work site. The Region Traffic Office should be contacted for concurrence with reductions in the R distances.

Priorities for the Application of Truck Mounted Attenuators (TMA)

Closure / Exposure Condition	Priority			
	Freeway	Non-Freeway with Speed Limit		
		> 50 mph	40-45 mph	< 35 mph
No Formal Lane Closure Shadow Vehicle for Operation Involving Exposed Personnel	*1	2	3	4
Shadow Vehicle for Operation Not Involving Exposed Personnel	1	2	3	4
No Formal Shoulder Closure Shadow Vehicle for Operation Involving Exposed Personnel	2	3	3	3
Shadow Vehicle for Operation Not Involving Exposed Personnel	2	3	4	5
Formal Lane Closure Protective vehicle for Operation Involving Exposed Personnel	2	3	4	5
Protective vehicle for Condition Involving Significant Hazard	2	3	4	5
Formal Shoulder Closure Protective vehicle for Operation Involving Exposed Personnel	3	4	5	5
Protective vehicle for Condition Involving Significant Hazard	3	4	5	5

* The numerical rank indicates the level of priority assigned to the use of a TMA on an assigned shadow/protective vehicle. The use of a TMA under the defined condition is:

1. very highly recommended
2. highly recommended
3. recommended
4. desirable
5. may be justified on the basis of special conditions encountered on an individual project.

7. **Portable Changeable Message Signs (PCMS):**

- Recommended for high speed, high volume roadways, or work operations that require a highly visible message.
- Shall ***not*** be used to replace required signs
- Place in advance of other temporary traffic control zone signing.
- Should be visible for ½ mile minimum (both day and night).
- Should be legible for at least 650 ft. (all lanes).
- Should be able to be read twice at the posted speed.
- Each individual display should convey a single thought.
- A complete message cycle should consist of ***no more than two*** displays in sequence.
- Bottom of sign panel shall be a minimum of 7' above roadway.
- PCMS shall automatically adjust its light source relative to surrounding conditions.
- Messages shall not scroll horizontally or vertically across the sign face.
- Consider truck mounted PCMS for shadow vehicles.

8. **Sequential Arrow Panel (Flashing Arrow Board):**

- Required for all lane closures on multi-lane roads, except during emergencies.
- An arrow shall not be used on a multi-lane roadway to laterally shift traffic.
- An arrow display shall not be used on a two lane, two way roadway.
- Do not use arrow display for shoulder closures.
- Use caution mode for shoulder closures.
- Only the four corner flash shall be used to indicate caution.
- Use ***only one*** arrow display per lane being closed (unless used in mobile operations).
- Arrow should be used in combination with other appropriate traffic control devices.

- Arrow display shall be capable of a minimum 50 percent dimming.

- For stationary lane closure, the arrow should be located on the shoulder at the beginning of the taper.

- The arrow shall be located behind channelizing devices (unless used in mobile operations).

- Arrow panels should be visible for ½ mile minimum, depending upon arrow type and conditions.

- An arrow display with a shadow (early warning) vehicle is allowed on mobile lane closure operations.

9. **Temporary Traffic Control / Channelizing Devices:**

   Traffic safety cones are the most common device used to separate and guide traffic past a work area. Cones and tubular markers must be 18" tall, except for high speed, high volume, or night-time operations, where they must be 28" tall, and reflectorized. Traffic safety drums must be 36" tall, and are recommended for use on freeways due to their greater visibility and imposing size. Maximum spacing requirements are shown on the TCP's. The Table on page 14 is provided to help select the proper taper lengths and number of devices needed. Tighter spacing may be desirable, under some conditions, to enhance motorists' guidance.

10. **Water Filled Barrier:**

    Water filled barriers are longitudinal barrier systems that use light weight modules pinned together and filled with water to form a barrier. They are ***not intended*** as a replacement for concrete barrier. In emergency maintenance situations, they may be considered for short-term use as a substitute for concrete barrier. Two different systems (Triton and Guardian) have been crash tested and approved for WSDOT use.

    Caution: ***Depending upon*** vehicle speeds and potential angle of impact, a lateral deflection space of ***up to*** 23 feet ***can be*** required behind the barrier.

    Evaluate risk and site conditions, and ***if*** used, follow the manufacturer's specifications and recommendations. Contact the Region Traffic Office, or OSC Design Office, for advise on use of this device and assistance in determining the deflection space requirement behind the barrier.

    Do not use in lane transitions unless the situation meets with manufacturer's specifications, ***and*** ensure approach ends are crashworthy, or are protected with a TMA."

11. **Concrete Barrier:**

A semi-rigid barrier designed to prevent intrusion of errant vehicles into work areas. Recommended for long term stationary work areas with high exposure to traffic. Contact the Region Traffic Office Staff for site specific placement information.

Consider the following for use of concrete barriers:

- Areas where there is a high potential for injury to workers or "no escape" areas such as internal lane work, work zones in tunnels, bridges, lane expansion work, etc.
- Long term, stationary jobs
- Areas of high exposure to workers and motorists such as high speed and high volume of traffic.

Consider the following for use of movable barrier such as Transfer/Transport Vehicle (TM) (barrier and special vehicle):

- High volume traffic conditions with very short-term lane closures.
- Continuous operation over an extended period of time, where there is a need to get the lane back in operation at some point in the day. (Could be used in lieu of reduced lane widths or lane reduction, i.e. HOV lane additions; wall next to roadway.)

12. **Barricades:**

Generally used to protect spot hazards but can also be used to close roadways and sidewalks with appropriate signing. Barricades can also be used to provide additional protection to work areas. *Lights used to channelize traffic must be steady burning (Type C).*

13. **Flares:**

All work vehicles should carry a supply of flares. Use flares only to alert drivers to emergencies and not as routine traffic control device. Emergencies are defined as unexpected events where life threatening conditions, injuries or property damage may occur unless immediate action is taken. Use caution at accident sites where flammable materials, such as fuel spills, are suspected.

Consider the following for use of flares:

- Primarily used in high hazard conditions only (i.e. accidents, spills, equipment breakdowns, dangerous snow and ice conditions, etc.)
- Use electronic flares or orange/red-glow sticks instead of burning flares where flammable materials are suspected.

FLAGGING

- Flagging should be employed only when all other methods of traffic control are inadequate to direct, or control, traffic.

- Locate the flagger off the traveled portion of the roadway. More than one flagger may be necessary to achieve traffic control in both directions. A means of communication between flaggers must be considered in these situations. Communication can be visual, or by hand held radio.

- Only persons who have successfully completed an approved flagging course and who possess current flagging certification recognized in Washington State can be used as flaggers.

- Freeway characteristics do not lend themselves to effective flagging. High speed multiple lanes and normal driver expectancy do not provide an opportunity for the flagger to actually warn or direct traffic, therefore flagging on freeways is not normally recommended. However, using a *"spotter"* may be helpful to protect the work crew.

- In a mobile flagging operation, all signs associated with the flagger must be moved ahead whenever work advances to more than 2 miles from the advance warning signs; also, **the "flagger ahead (symbol or text message)" sign is recommended to be within 1,000 feet of the flagger, any time a flagger is deployed.**

- During hours of darkness flagger stations shall be illuminated without causing glare to the traveling public.

Flagger's Rules of Conduct

1. Be clearly visible to approaching traffic at all times. Motorists should be able to see you from 500 feet away.

2. Do not stand in front of parked/stopped cars.

3. Always be aware of oncoming traffic.

4. Do not step into, or turn your back on the traffic.

5. Stand on the shoulder of the road observing traffic and the work zone. Sometimes you may have to stand on the opposite side of the road to effectively direct traffic around the work area.

6. Choose the best flagging position that will provide the greatest color contrast between you and the background.

7. If at all possible, do not stand in the shade.

8. Never flag from inside a vehicle.

9. Do not lean, sit or lie on a vehicle.

10. Stand alone. Do not permit a group of workers to congregate around you.

11. Familiarize yourself with the nature of the work being performed. Be able to answer motorists' questions.

12. Establish a warning signal with the work crew in case of an emergency.

13. Plan an escape route in case of an emergency.

14. Stay alert! Be ready to respond to an emergency.

15. Record the license number and description of any vehicle whose driver disobeys your instructions and threatens the safety of the work area. Report information to authorities.

16. Be courteous and professional.

17. Keep your mind on your job. Be aware of the work in progress.

18. Do not do any other work when flagging.

19. Do not involve yourself in unnecessary conversation with workers, pedestrians, or motorists.

20. Do not leave your position until you are appropriately relieved.

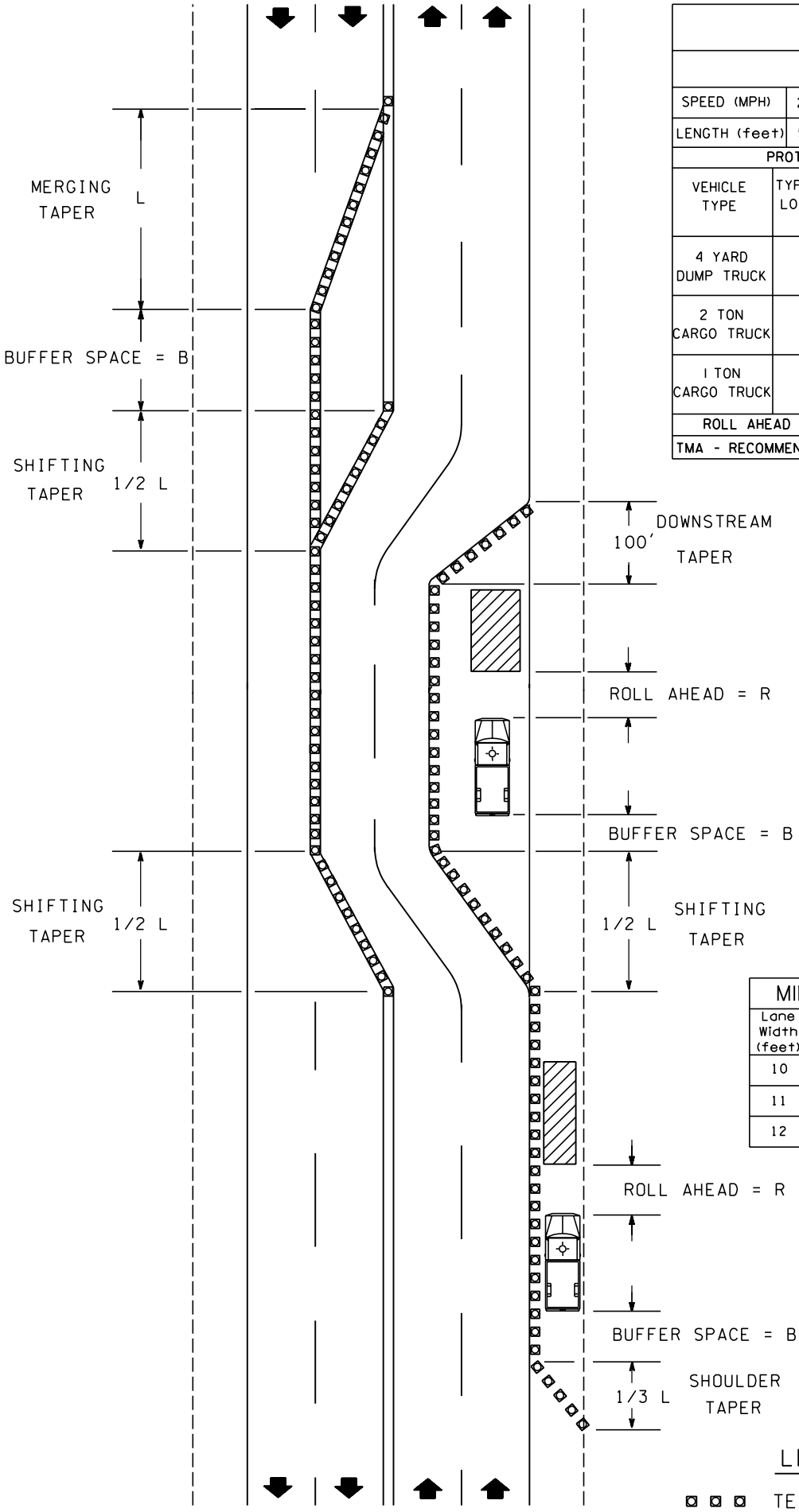
21. Cover, turn or remove the "FLAGGER AHEAD" sign when a flagger is no longer on duty.

22. Always carry your flagger certification card while on the job.

CHECKLIST FOR ESTABLISHING A TEMPORARY TRAFFIC CONTROL ZONE*

COMPLETED	ITEM
☐	Determine the duration of work, (Mobile, Short-Term, Intermediate Term/Night)*
☐	Select hours of work to avoid peak periods (refer to work hour chart when applicable).*
☐	Select the appropriate layout(s), using duration, type of roadway, volume, and speed, from guidelines.
☐	Determine any modifications to typical layout(s). • Check decision sight distance • Intersection/driveways • Allow for buffer space free of obstructions
☐	Check the condition of devices (Refer to Quality Standards Booklet).
☐	Install devices beginning with the first device the driver will see. Device spacing as per chart on TCP.
☐	Conduct a drive through to check for problems.
☐	Document temporary traffic control zone, problems and major modifications to the layouts.
☐	Maintain devices while in place.
☐	Complete work.
☐	Remove the devices as soon as work is completed, beginning with the last device placed.

*Utilize the Region Traffic Office Staff to address concerns and questions.



BUFFER DATA										
BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	55	85	120	170	220	280	335	415	485	585

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*				
VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)	
4 YARD DUMP TRUCK	24,000	60-70	100	* VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.
		50-55	75	
		45	50	
2 TON CARGO TRUCK	15,000	60-70	150	
		50-55	100	
		45	75	
1 TON CARGO TRUCK	10,000	60-70	200	
		50-55	150	
		45	100	
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT				
TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.				

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
35/45	30	60
25/30	20	40

MINIMUM TAPER LENGTH (L) IN FEET										
Lane Width (feet)	Posted Speed (mph)									
	25	30	35	40	45	50	55	60	65	70
10	105	150	205	265	450	500	550	-	-	-
11	115	165	225	295	495	550	605	660	-	-
12	125	180	245	320	540	600	660	720	780	840

LEGEND

TEMPORARY TRAFFIC CONTROL DEVICES

PROTECTIVE VEHICLE - RECOMMENDED

TAPER & BUFFER SPACE DETAILS

TAPER / CHANNELIZING DEVICE TABLE

MERGING, SHIFTING & SHOULDER TAPER LENGTHS
AND NUMBER OF CHANNELIZATION DEVICES USED

(All minimums)

Lane Width	10 Feet				11 Feet				12 Feet				Shoulder Tapers (Assumes 10' Shoulders)		
	L		1/2 L		L		1/2 L		L		1/2 L		*1/3L		
MPH	Merging	Devices	Shifting	Devices	Merging	Devices	Shifting	Devices	Merging	Devices	Shifting	Devices	MPH	(ft) Length	Devices
20	70	5	35	3	75	5	40	3	80	5	40	3	20	25	3
25	105	6	55	4	115	7	60	4	125	7	65	4	25	35	3
30	150	8	75	5	165	9	85	5	180	10	90	5	30	50	3
35	205	8	105	5	225	9	115	5	245	9	125	5	35	70	4
40	270	10	135	6	295	11	150	6	320	12	160	6	40	90	4
45	450	16	225	9	495	18	250	9	540	19	270	10	45	150	6
50	500	14	250	8	550	15	275	8	600	16	300	9	50	170	6
55	550	15	275	8	605	16	305	9	660	18	330	9	55	185	6
60	600	16	300	9	660	18	330	9	720	19	360	10	60	200	6
65	650	17	325	9	715	19	370	10	780	21	390	11	65	220	7
70	700	19	350	10	770	20	385	11	840	22	420	12	70	235	7

**L for shoulder taper equals Shoulder Width x Speed. Figures shown are for a 10' shoulder.*

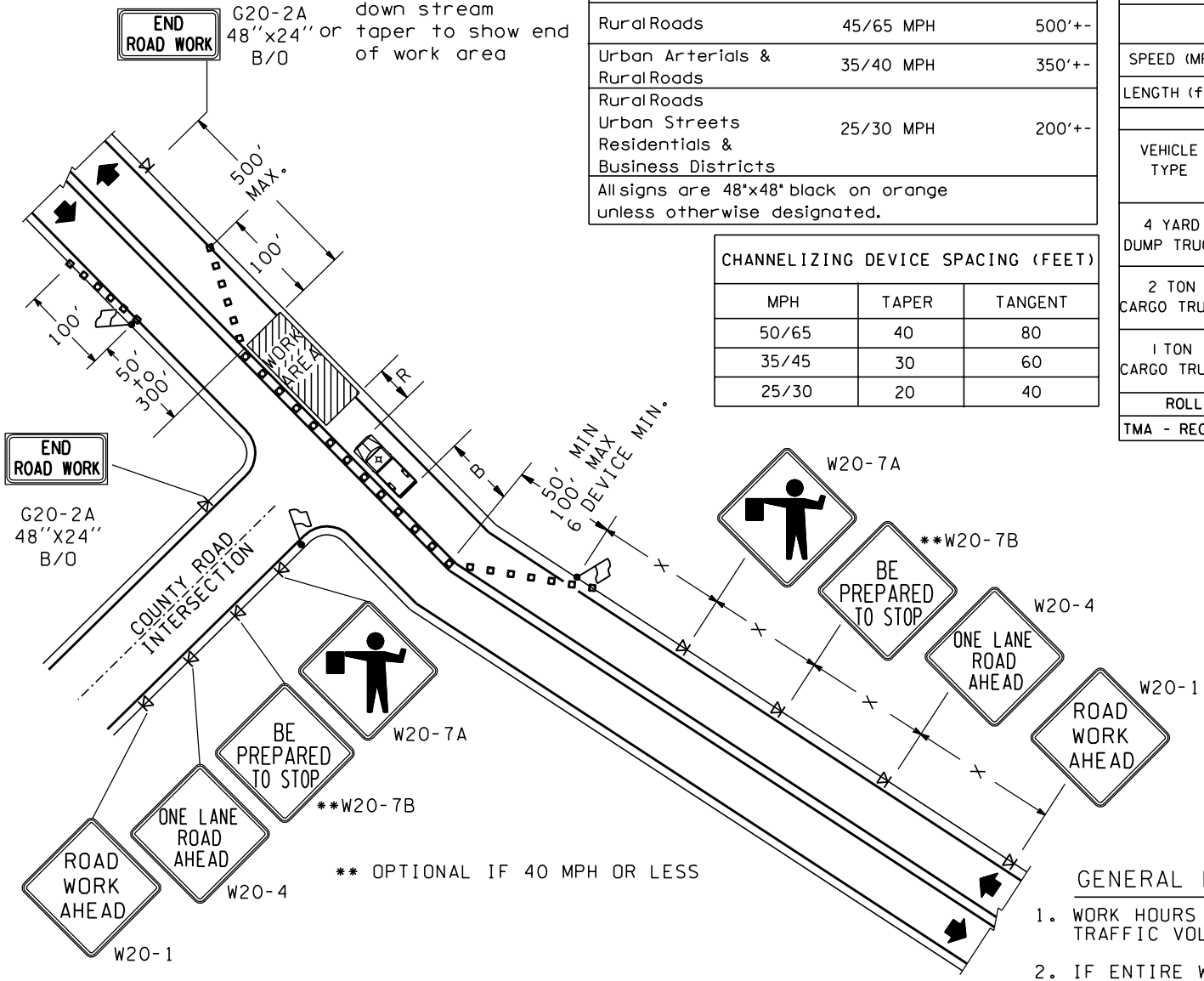
STATIONARY OR SHORT DURATION WORK ZONES

Traffic Control Plans (TCP's) 1 to 11

Stationary work zones are used for work activities that exceed one hour but could last for several days. Signs and channelizing devices are required for stationary work zones. Devices, such as sequential arrow panels, barricades and protective vehicles, may also be used depending on the situation. For longer term projects, temporary concrete barriers or water filled barriers, temporary pavement markings and post mounted signs might be typical devices. Examples of stationary work zone operations include: light standard repair, paving, sign installation and bridge repair. Stationary work zone traffic control is usually associated with a substantial work operation that may have many workers, equipment, truck hauling and flagging. Traffic operation, all work activities, workers and flaggers must be incorporated into the work zone and provided for during planning and selecting the Traffic Control Plans (TCP's).

Short duration work zones are used for work activities less than 60 minutes. Due to the short work time simplified traffic control set-ups are allowed to reduce the hazards of traffic exposure to workers. The time it may take to set up a full complement of signs and devices could approach the amount of time it requires to perform the work. Careful consideration of traffic and roadway conditions must be given to each work zone prior to selecting the most appropriate traffic control set-up. Shoulder work and low speed, low volume lane work may only require the use of the work vehicle hazard beacon, a flagger and a warning sign. High speed, high volume lane work requires a full lane closure set-up, even through work duration may be 60 minutes or less. Remember, short duration work is not a "short cut", it's a traffic control method that reduces worker exposure to traffic hazards by using larger, more mobile equipment instead of many smaller devices (cones are recommended in most cases since they are quick to set up for small work zones). Examples of short duration work zone operations include, re-lamping, pot hole repair, Vactor work, etc..

The following TCP's show typical stationary and short duration work zones.



SIGN SPACING = X (FEET)

Rural Roads	45/65 MPH	500'+-
Urban Arterials & Rural Roads	35/40 MPH	350'+-
Rural Roads Urban Streets Residentials & Business Districts	25/30 MPH	200'+-

All signs are 48"x48" black on orange unless otherwise designated.

CHANNELIZING DEVICE SPACING (FEET)

MPH	TAPER	TANGENT
50/65	40	80
35/45	30	60
25/30	20	40

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	—
LENGTH (feet)	55	85	120	170	220	280	335	415	485	—

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R•

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-65	100
		50-55	75
		45	50
2 TON CARGO TRUCK	15,000	60-65	150
		50-55	100
		45	75
1 TON CARGO TRUCK	10,000	60-65	200
		50-55	150
		45	100

• VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE. SEE PAGE 5.

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT.

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

FOR PILOT CAR OPERATIONS THE FOLLOWING SIGNS SHALL BE REQUIRED TO SUPPLEMENT THE SIGNS SHOWN ON THIS PLAN.

G20-4
36"X18"
B/O

SP-1
14" X 14"
4" C
B/O

PILOT CAR FOLLOW ME

(ON PILOT CAR)

STOP
WAIT FOR
PILOT CAR

(FOR ROAD APPROACHES AS NEEDED)

LEGEND

- SIGN LOCATION
- TEMPORARY TRAFFIC CONTROL DEVICES
- FLAGGING STATION
- PROTECTIVE VEHICLE - RECOMMENDED

GENERAL NOTES

1. WORK HOURS SHALL BE DAYLIGHT HOURS ONLY, UNLESS TRAFFIC VOLUMES OR EMERGENCIES DICTATE OTHERWISE.
2. IF ENTIRE WORK AREA IS VISIBLE FROM ONE STATION, ONE FLAGGER MAY BE USED. OTHERWISE, ONE FLAGGER WILL BE REQUIRED FOR EACH DIRECTION.
3. EXTEND DEVICES TAPER ACROSS SHOULDER.
4. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.
5. SIGN SEQUENCE IS THE SAME FOR BOTH DIRECTIONS OF TRAVEL ON THE HIGHWAY.

ALTERNATING ONE-WAY TRAFFIC
FLAGGER CONTROLLED / PILOT CAR CONTROLLED
TCP 1

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	55	85	120	170	220	280	335	415	485	585

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R•

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-70	100
		50-55	75
		45	50
2 TON CARGO TRUCK	15,000	60-70	150
		50-55	100
		45	75
1 TON CARGO TRUCK	10,000	60-70	200
		50-55	150
		45	100

• VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE. SEE PAGE 5.

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT.

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

MINIMUM TAPER LENGTH (L) IN FEET

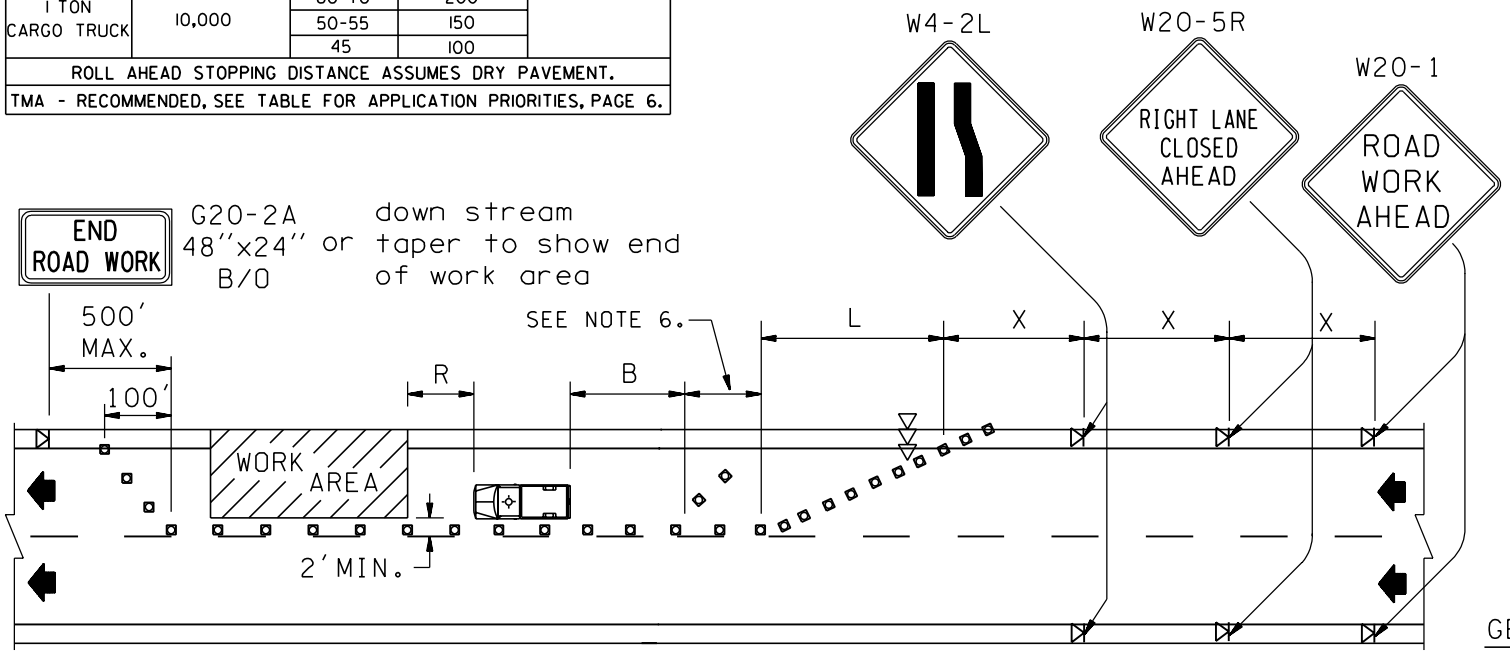
Lane Width (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	105	150	205	265	450	500	550	–	–	–
11	115	165	225	295	495	550	605	660	–	–
12	125	180	245	320	540	600	660	720	780	840

SIGN SPACING = X (FEET)

Freeways & Expressways	55/70 MPH	1500'+- (OR AS PER MUTCD)
Rural Roads	45/55 MPH	500'+-
Urban Arterials & Rural Roads	35/40 MPH	350'+-
Rural Roads Urban Streets Residentials & Business Districts	25/30 MPH	200'+-

All signs are 48"x48" black on orange unless otherwise designated.

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
35/45	30	60
25/30	20	40



(SAMPLE MESSAGE)

PCMS	
1	2
RIGHT LANE CLOSED	1 MILE AHEAD
1.5 SEC	1.5 SEC

Field locate 1 mile +- in advance of lane closure.

GENERAL NOTES

1. PROTECTIVE VEHICLE RECOMMENDED- MAY BE A WORK VEHICLE.
2. CONTACT REGION TRAFFIC OFFICE STAFF FOR WORK HOURS.
3. EXTEND DEVICE TAPER ACROSS SHOULDER.
4. DEVICES SHOULD NOT ENCROACH INTO ADJACENT LANES.
5. PCMS RECOMMENDED.
6. USE TRANSVERSE DEVICES IN CLOSED LANE EVERY 1000' +-
7. TRAFFIC SAFETY DRUMS RECOMMENDED FOR FREEWAY USE (IN LIEU OF CONES).

LEGEND

- SIGN LOCATION
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED

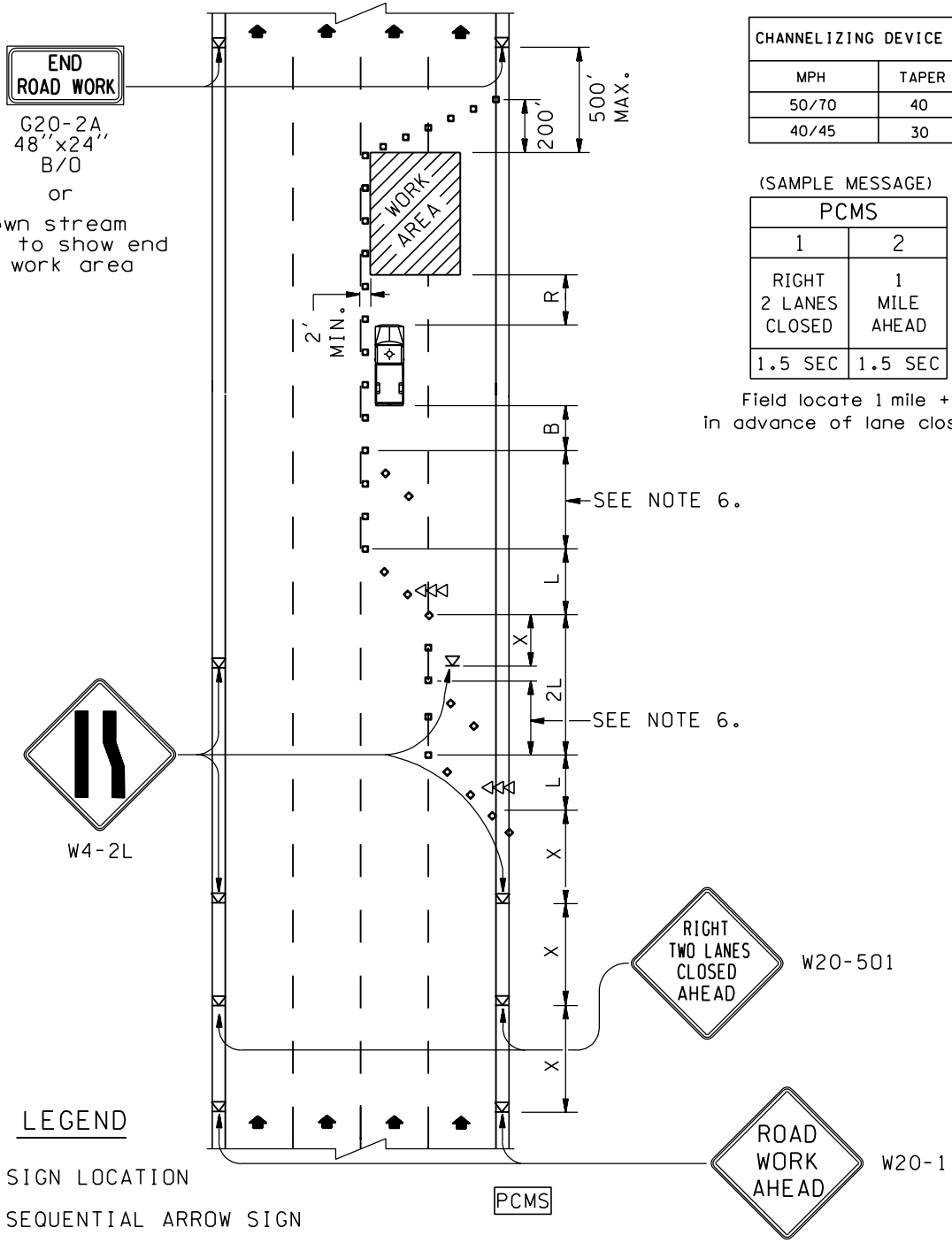
SINGLE-LANE CLOSURE FOR MULTI-LANE ROADWAYS TCP 2

END ROAD WORK

G20-2A
48"x24"
B/O

or

down stream
taper to show end
of work area



CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
40/45	30	60

(SAMPLE MESSAGE)

PCMS	
1	2
RIGHT 2 LANES CLOSED	1 MILE AHEAD
1.5 SEC	1.5 SEC

Field locate 1 mile +-
in advance of lane closure.

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	—	—	—	170	220	280	335	415	485	585

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)	
4 YARD DUMP TRUCK	24,000	60-70	100	* VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE. SEE PAGE 5.
		50-55	75	
		45	50	
2 TON CARGO TRUCK	15,000	60-70	150	
		50-55	100	
		45	75	
1 TON CARGO TRUCK	10,000	60-70	200	
		50-55	150	
		45	100	

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

MINIMUM TAPER LENGTH (L) IN FEET

Lane Width (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	-	-	-	265	450	500	550	-	-	-
11	-	-	-	295	495	550	605	660	-	-
12	-	-	-	320	540	600	660	720	780	840

SIGN SPACING = X (FEET)

Freeways & Expressways	55/70 MPH	1500'+- (OR AS PER MUTCD)
Urban Arterials	45/65 MPH	500'+-
Urban Arterials	40 MPH	350'+-

All signs are 48"x48" black on orange unless otherwise designated.

LEGEND

- SIGN LOCATION
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED
- PCMS — PORTABLE CHANGEABLE MESSAGE SIGN

GENERAL NOTES

1. PROTECTIVE VEHICLE RECOMMENDED WHEN AVAILABLE- MAY BE A WORK VEHICLE.
2. CONTACT REGION TRAFFIC OFFICE STAFF FOR WORK HOURS.
3. EXTEND DEVICE TAPER ACROSS SHOULDER.
4. DEVICES SHALL NOT ENCROACH INTO ADJACENT LANES.
5. PCMS RECOMMENDED.
6. USE TRANSVERSE DEVICES IN CLOSED LANE EVERY 1000' +-
7. TRAFFIC SAFETY DRUMS RECOMMENDED FOR ALL TAPERS.

DOUBLE-LANE CLOSURE FOR MULTI-LANE FREEWAYS TCP 3

BUFFER DATA

BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	55	85	120	—	—	—	—	—	—	—

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-70	-----
		50-55	-----
		45	50
2 TON CARGO TRUCK	15,000	60-70	-----
		50-55	-----
		45	75
1 TON CARGO TRUCK	10,000	60-70	-----
		50-55	-----
		45	100

*** VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.**

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

SIGN SPACING = X (FEET)

Urban Arterials	35 MPH	350'+-
Urban Streets Residentials & Business Districts	25/30 MPH	200'+-

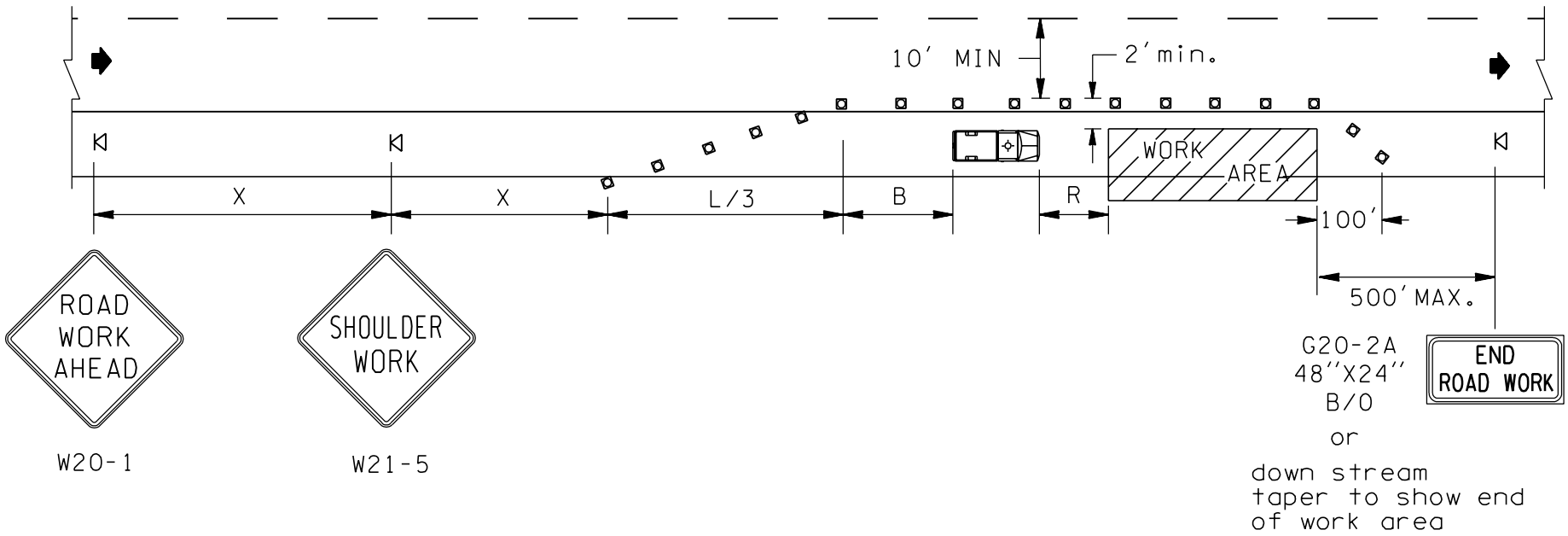
All signs are 48"x48" black on orange unless otherwise designated.

CHANNELIZING DEVICE SPACING (FEET)

MPH	TAPER	TANGENT
35	30	60
25/30	20	40

MINIMUM TAPER LENGTH (L) IN FEET

Lane Width (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	105	150	205	-	-	-	-	-	-	-
11	115	165	225	-	-	-	-	-	-	-
12	125	180	245	-	-	-	-	-	-	-



LEGEND

- SIGN LOCATION
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED

SHOULDER CLOSURE - LOW SPEED

(35 MPH OR LESS)

TCP 4

GENERAL NOTES

1. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	—	—	—	170	220	280	335	415	485	585

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-70	100
		50-55	75
		45	50
2 TON CARGO TRUCK	15,000	60-70	150
		50-55	100
		45	75
1 TON CARGO TRUCK	10,000	60-70	200
		50-55	150
		45	100

*** VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.**

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

SIGN SPACING = X (FEET)

Freeways & Expressways	55/70 MPH	1500'+- (OR AS PER MUTCD)
Rural Roads	45/65 MPH	500'+-
Urban Arterials	40 MPH	350'+-

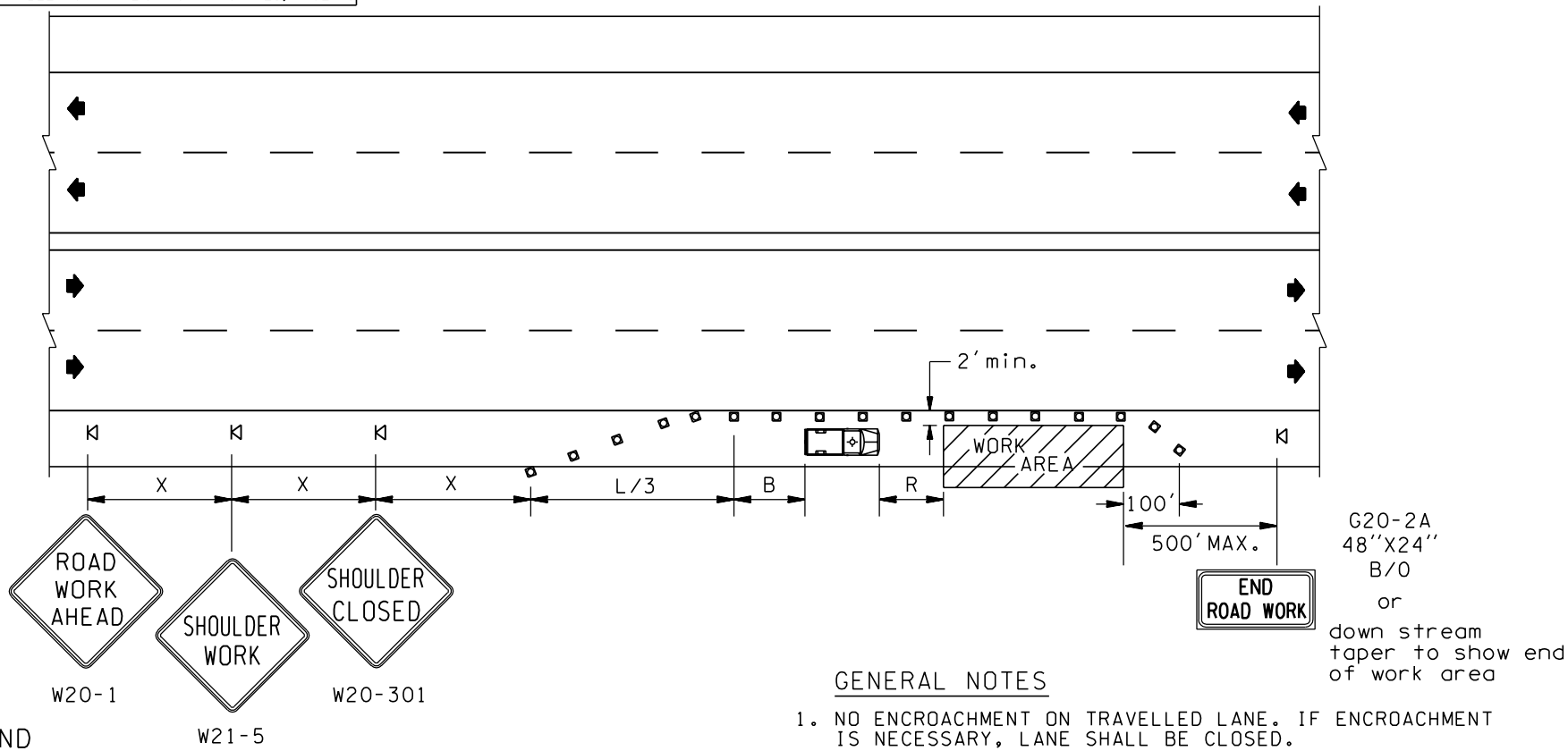
All signs are 48"x48" black on orange unless otherwise designated.

CHANNELIZING DEVICE SPACING (FEET)

MPH	TAPER	TANGENT
50/70	40	80
40/45	30	60

MINIMUM TAPER LENGTH (L) IN FEET

Lane Width (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	-	-	-	265	450	500	550	-	-	-
11	-	-	-	295	495	550	605	660	-	-
12	-	-	-	320	540	600	660	720	780	840



GENERAL NOTES

1. NO ENCROACHMENT ON TRAVELLED LANE. IF ENCROACHMENT IS NECESSARY, LANE SHALL BE CLOSED.
2. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.

LEGEND

SIGN LOCATION

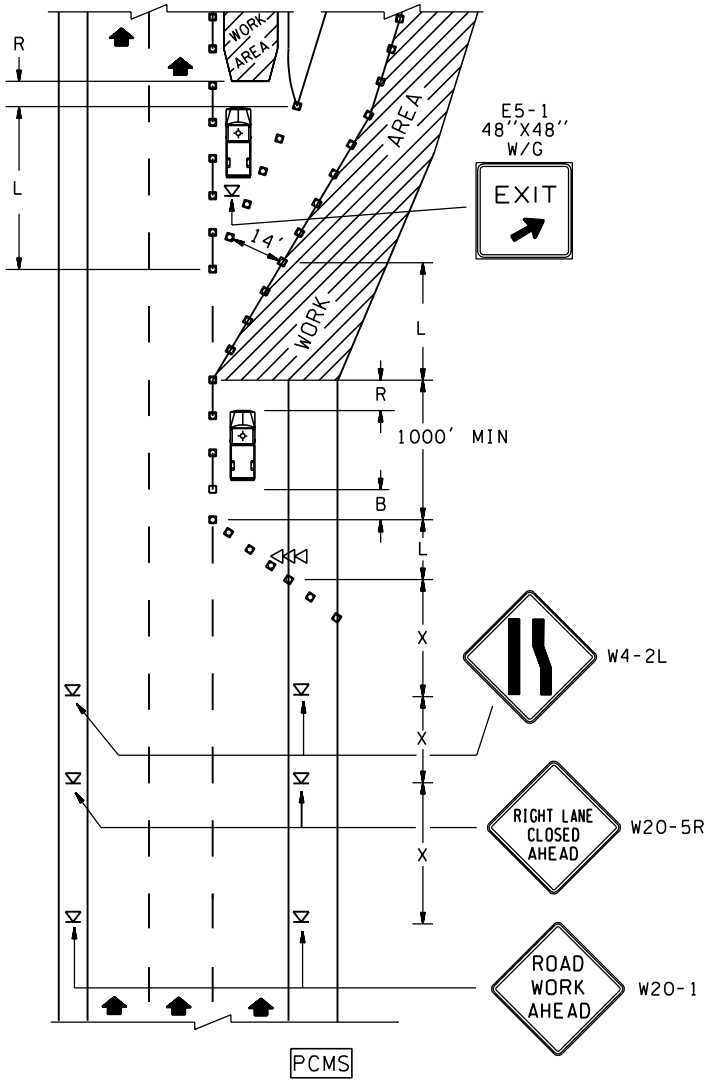
TEMPORARY TRAFFIC CONTROL DEVICES

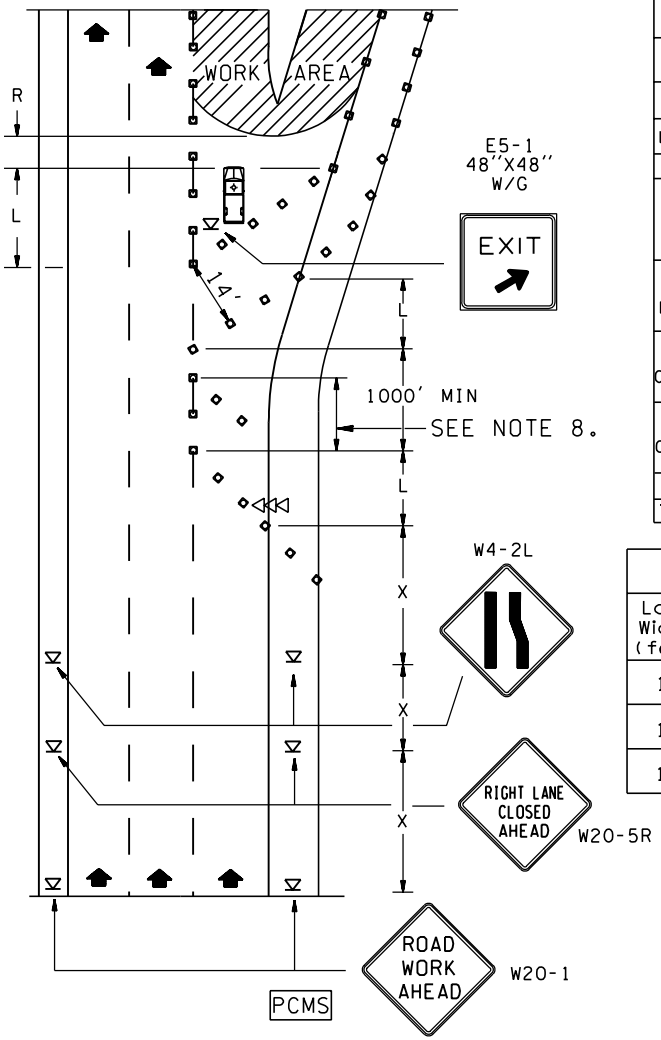
PROTECTIVE VEHICLE - RECOMMENDED

SHOULDER CLOSURE - HIGH SPEED

(40 MPH OR HIGHER)

TCP 5





BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	—	—	—	170	220	280	335	415	485	585

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)	
4 YARD DUMP TRUCK	24,000	60-70	100	* VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE. SEE PAGE 5.
		50-55	75	
		45	50	
2 TON CARGO TRUCK	15,000	60-70	150	
		50-55	100	
		45	75	
1 TON CARGO TRUCK	10,000	60-70	200	
		50-55	150	
		45	100	

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

MINIMUM TAPER LENGTH (L) IN FEET

Lane Width (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	-	-	-	265	450	500	550	-	-	-
11	-	-	-	295	495	550	605	660	-	-
12	-	-	-	320	540	600	660	720	780	840

SIGN SPACING = X (FEET)

Freeways & Expressways	55/70 MPH	1500'+- (OR AS PER MUTCD)
Rural Roads	45/65 MPH	500'+-
Urban Arterials	40 MPH	350'+-

All signs are 48"x48" black on orange unless otherwise designated.

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
40/45	30	60

(SAMPLE MESSAGE)

PCMS	
1	2
RIGHT LANE CLOSED	1 MILE AHEAD
1.5 SEC	1.5 SEC

Field locate 1 mile +- in advance of lane closure.

LEGEND

- SIGN LOCATION
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED
- PCMS — PORTABLE CHANGEABLE MESSAGE SIGN

GENERAL NOTES

1. THE DESIRABLE RAMP OPENING WIDTH IS 14'.
2. A G20-2A END ROAD WORK SIGN SHOULD BE INSTALLED ABOUT 500 FEET BEYOND THE WORK AREA OR USE A DOWN STREAM TAPER.
3. CONTACT REGION TRAFFIC OFFICE STAFF FOR WORK HOURS.
4. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.
5. EXTEND DEVICE TAPER ACROSS SHOULDER.
6. PCMS RECOMMENDED.
7. TRAFFIC SAFETY DRUMS RECOMMENDED FOR FREEWAY USE (IN LIEU OF CONES).
8. USE TRANSVERSE DEVICES IN CLOSED LANE EVERY 1000' +-

TEMPORARY OFF-RAMP FOR MULTI-LANE FREEWAYS TCP 6

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	—	—	—	170	220	280	335	415	485	585

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-70	100
		50-55	75
		45	50
2 TON CARGO TRUCK	15,000	60-70	150
		50-55	100
		45	75
1 TON CARGO TRUCK	10,000	60-70	200
		50-55	150
		45	100

*** VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE. SEE PAGE 5.**

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

SIGN SPACING = X (FEET)

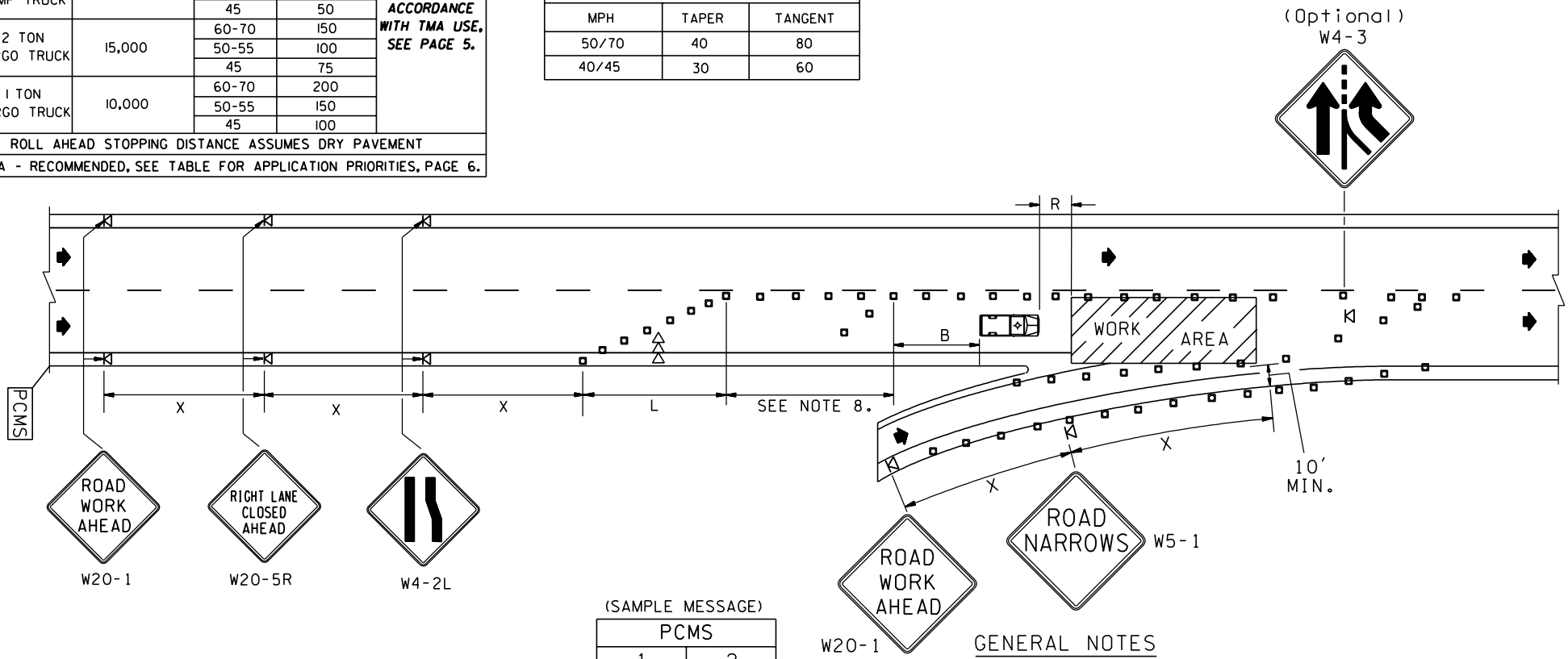
Freeways & Expressways	55/70 MPH	1500'+- (OR AS PER MUTCD)
Rural Roads	45/65 MPH	500'+-
Urban Arterials	40 MPH	350'+-

All signs are 48"x48" black on orange unless otherwise designated.

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
40/45	30	60

MINIMUM TAPER LENGTH (L) IN FEET

Lane Width (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	-	-	-	265	450	500	550	-	-	-
11	-	-	-	295	495	550	605	660	-	-
12	-	-	-	320	540	600	660	720	780	840



(SAMPLE MESSAGE)

PCMS	
1	2
RIGHT LANE CLOSED	1 MILE AHEAD
1.5 SEC	1.5 SEC

Field locate 1 mile +- in advance of lane closure.

GENERAL NOTES

1. THE DESIRABLE RAMP OPENING WIDTH IS 14'.
2. A G20-2A END ROAD WORK SIGN SHOULD BE INSTALLED ABOUT 500 FEET BEYOND THE WORK AREA OR USE A DOWN STREAM TAPER.
3. CONTACT REGION TRAFFIC OFFICE STAFF FOR WORK HOURS.
4. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.
5. EXTEND DEVICE TAPER ACROSS SHOULDER.
6. PCMS RECOMMENDED.
7. TRAFFIC SAFETY DRUMS RECOMMENDED FOR FREEWAY USE (IN LIEU OF CONES).
8. USE TRANSVERSE DEVICES IN CLOSED LANE EVERY 1000' +-

LEGEND

- SIGN LOCATION
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED
- PCMS — PORTABLE CHANGEABLE MESSAGE SIGN

TEMPORARY ON-RAMP (RIGHT LANE CLOSED) TCP 7

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	—	—	—	170	220	280	335	415	485	585

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-70	100
		50-55	75
		45	50
2 TON CARGO TRUCK	15,000	60-70	150
		50-55	100
		45	75
1 TON CARGO TRUCK	10,000	60-70	200
		50-55	150
		45	100

* VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE. SEE PAGE 5.

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

SIGN SPACING = X (FEET)

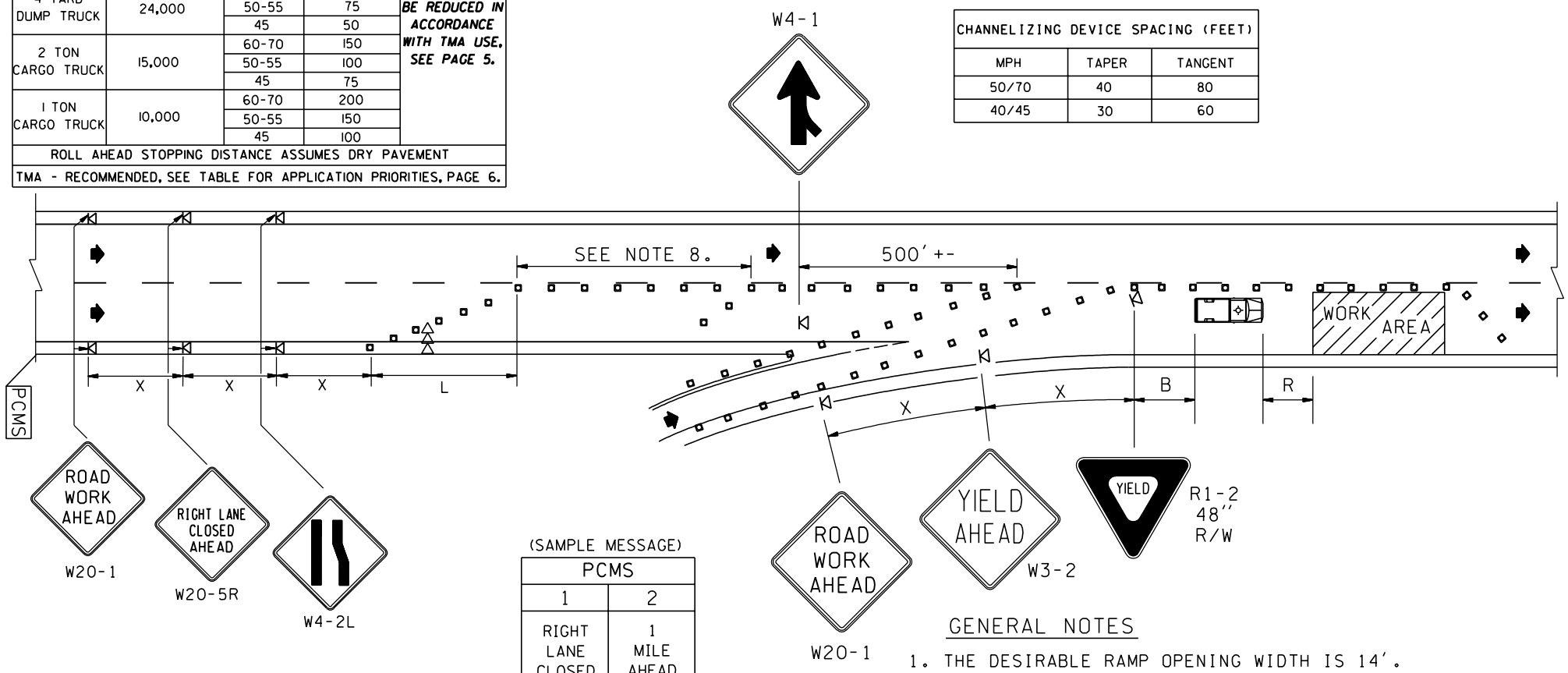
Freeways & Expressways	55/70 MPH	1500'+- (OR AS PER MUTCD)
Rural Roads	45/65 MPH	500'+-
Urban Arterials	40 MPH	350'+-

All signs are 48"x48" black on orange unless otherwise designated.

MINIMUM TAPER LENGTH (L) IN FEET

Lane Width (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	-	-	-	265	450	500	550	-	-	-
11	-	-	-	295	495	550	605	660	-	-
12	-	-	-	320	540	600	660	720	780	840

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
40/45	30	60



(SAMPLE MESSAGE)

PCMS	
1	2
RIGHT LANE CLOSED	1 MILE AHEAD
1.5 SEC	1.5 SEC

Field locate 1 mile +- in advance of lane closure.

GENERAL NOTES

1. THE DESIRABLE RAMP OPENING WIDTH IS 14'.
2. A G20-2A END ROAD WORK SIGN SHOULD BE INSTALLED ABOUT 500 FEET BEYOND THE WORK AREA OR USE A DOWN STREAM TAPER.
3. CONTACT REGION TRAFFIC OFFICE STAFF FOR WORK HOURS.
4. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.
5. EXTEND DEVICE TAPER ACROSS SHOULDER.
6. PCMS RECOMMENDED.
7. TRAFFIC SAFETY DRUMS RECOMMENDED FOR FREEWAY USE (IN LIEU OF CONES).
8. USE TRANSVERSE DEVICES IN CLOSED LANE EVERY 1000'+-

LEGEND

- SIGN LOCATION
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED

TEMPORARY ON-RAMP (RIGHT LANE CLOSED) TCP 8

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	55	85	120	170	220	280	—	—	—	—

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-70	-----
		50	75
		45	50
2 TON CARGO TRUCK	15,000	60-70	-----
		50	100
		45	75
1 TON CARGO TRUCK	10,000	60-70	-----
		50	150
		45	100

* VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE. SEE PAGE 5.

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

SIGN SPACING = X (FEET)

Rural Roads	45/50 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Rural Roads Urban Streets Residential & Business Districts	25/30 MPH	200'+-

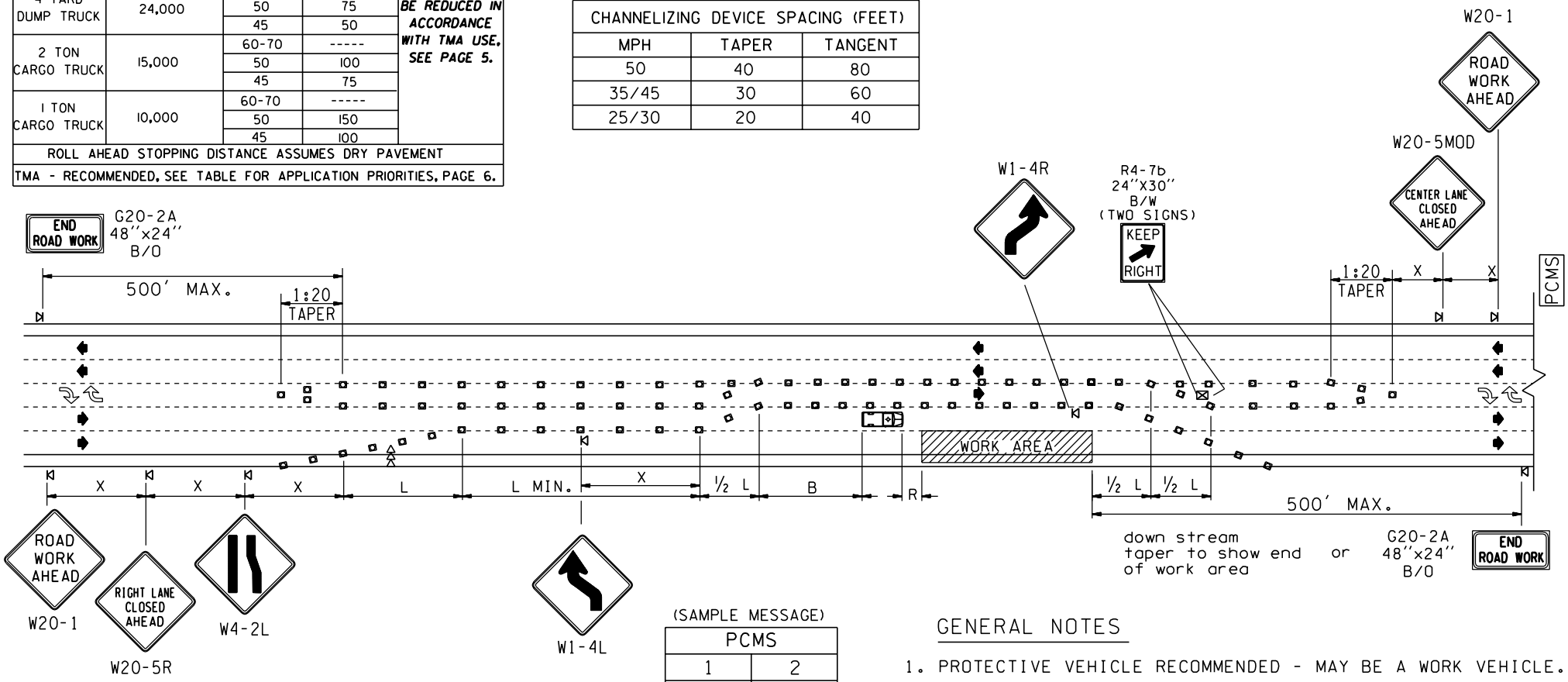
All signs are 48" X 48" black on orange unless otherwise designated

MINIMUM TAPER LENGTH = L (FEET)

LANE WIDTH (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	105	150	205	270	450	500	-	-	-	-
11	115	165	225	295	495	550	-	-	-	-
12	125	180	245	320	540	600	-	-	-	-

CHANNELIZING DEVICE SPACING (FEET)

MPH	TAPER	TANGENT
50	40	80
35/45	30	60
25/30	20	40



LEGEND

- ⊠ SIGN LOCATION
- ⋈ SIGN LOCATION
- ▷▷▷ SEQUENTIAL ARROW SIGN
- ◘ ◘ ◘ TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED
- PCMS PORTABLE CHANGEABLE MESSAGE SIGN

(SAMPLE MESSAGE)

PCMS	
1	2
CENTER LANE CLOSED	LIMITED TURNING
1.5 SEC	1.5 SEC

Field locate 1 mile +- in advance of lane closure.

GENERAL NOTES

1. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.
2. EXTEND TAPER ACROSS SHOULDER.
3. CONTACT REGION TRAFFIC OFFICE STAFF FOR WORK HOURS.
4. MAINTAIN A MINIMUM OF ONE ACCESS POINT FOR EACH BUSINESS WITHIN WORK AREA LIMITS.
5. IF THE LANE SHIFT IS SHORT AND HAS SHARP CURVES (30 MPH OR LESS) USE SIGN W1-3 IN LIEU OF SIGN W1-4.

RIGHT LANE CLOSURE WITH SHIFT
5 LANE ROADWAY
TCP 9

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	55	85	120	170	220	280	335	—	—	—

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-70	-----
		50-55	75
		45	50
2 TON CARGO TRUCK	15,000	60-70	-----
		50-55	100
		45	75
1 TON CARGO TRUCK	10,000	60-70	-----
		50-55	150
		45	100

*** VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.**

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

SIGN SPACING = X (FEET)

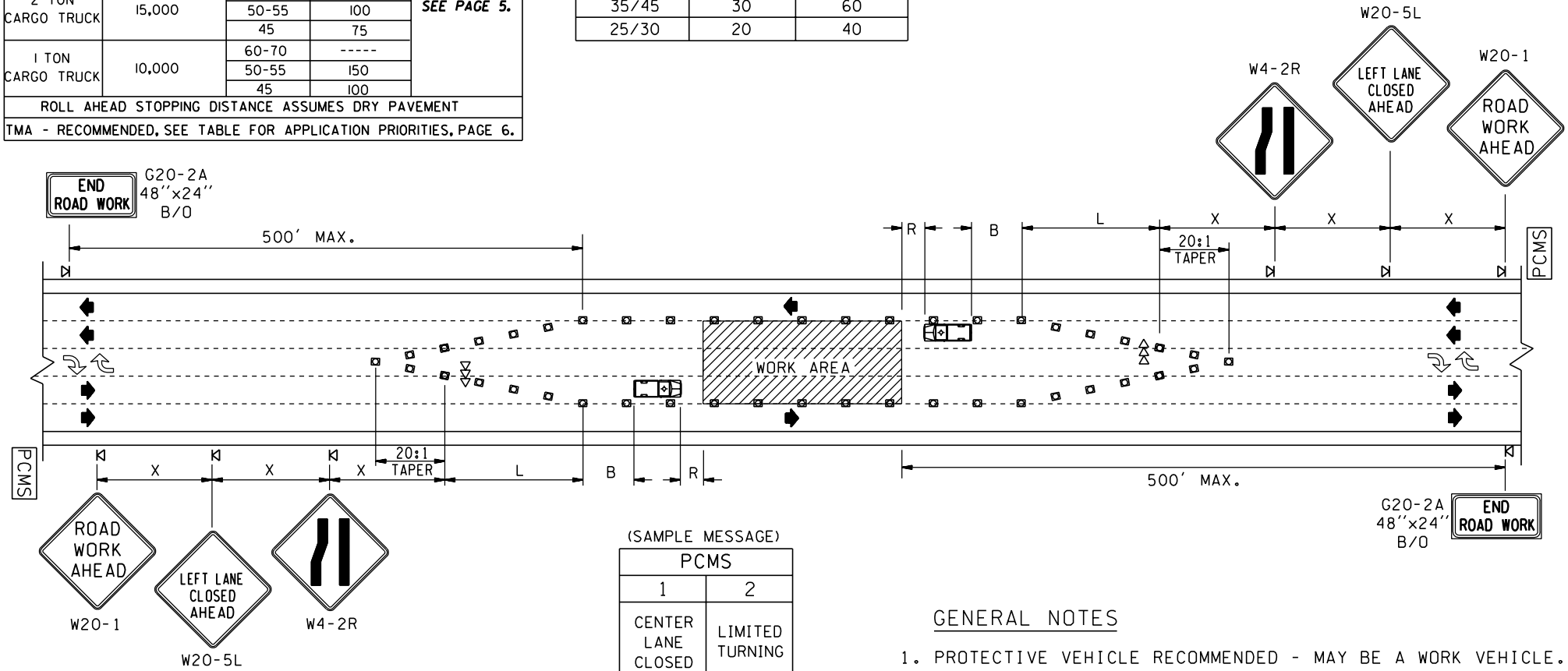
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Rural Roads Urban Streets Residential & Business Districts	25/30 MPH	200'+-

All signs are 48" X 48" black on orange unless otherwise designated

MINIMUM TAPER LENGTH = L (FEET)

LANE WIDTH (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	105	150	205	270	450	500	550	-	-	-
11	115	165	225	295	495	550	605	-	-	-
12	125	180	245	320	540	600	660	-	-	-

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/55	40	80
35/45	30	60
25/30	20	40



(SAMPLE MESSAGE)

PCMS	
1	2
CENTER LANE CLOSED	LIMITED TURNING
1.5 SEC	1.5 SEC

Field locate 1 mile +-
in advance of lane closure.

GENERAL NOTES

1. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.
2. CONTACT REGION TRAFFIC OFFICE STAFF FOR WORK HOURS.
3. MAINTAIN A MINIMUM OF ONE ACCESS POINT FOR EACH BUSINESS WITHIN WORK AREA LIMITS.

LEGEND

- SIGN LOCATION
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED
- PCMS PORTABLE CHANGEABLE MESSAGE SIGN

LEFT LANE AND CENTER TURN LANE CLOSURE - 5 LANE ROADWAY TCP 10

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65	70
LENGTH (feet)	—	—	—	170	220	280	335	415	—	—

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60	100
		50-55	75
		45	50
2 TON CARGO TRUCK	15,000	60	150
		50-55	100
		45	75
1 TON CARGO TRUCK	10,000	60	200
		50-55	150
		45	100

*** VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.**

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

MINIMUM TAPER LENGTH = L (FEET)

LANE WIDTH (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65	70
10	105	150	205	270	450	500	550	-	-	-
11	115	165	225	295	495	550	605	660	-	-
12	125	180	245	320	540	600	660	720	-	-

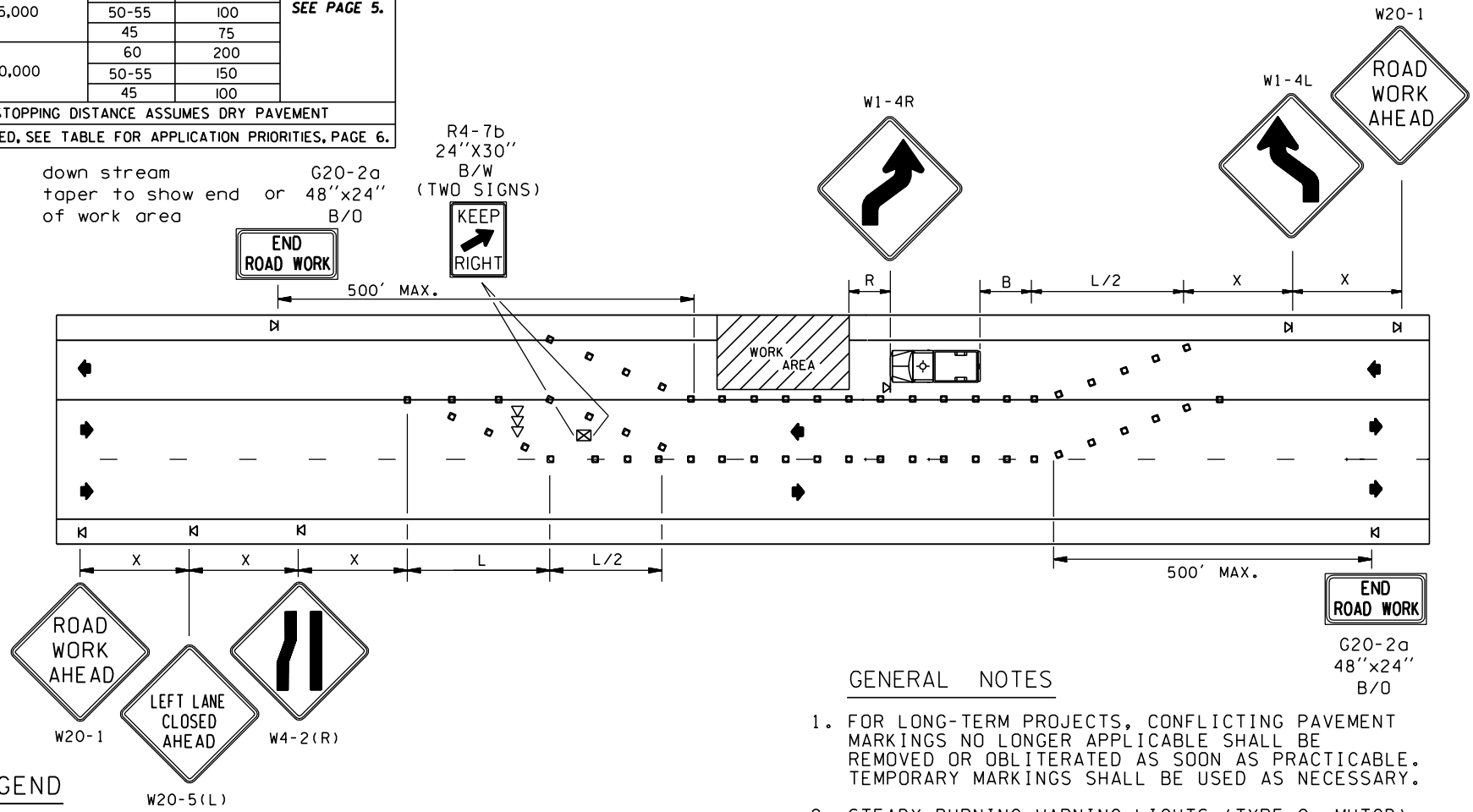
SIGN SPACING = X (FEET)

Rural Roads	45/60 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential & Business Districts	25/30 MPH	200'+-

All signs are 48" X 48" black on orange unless otherwise designated

CHANNELIZING DEVICE SPACING (FEET)

MPH	TAPER	TANGENT
50/60	40	80
35/45	30	60
25/30	20	40



GENERAL NOTES

1. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY.
2. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHOULD BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED
3. IF THE LANE SHIFT IS SHORT AND HAS SHARP CURVES (30 MPH OR LESS) USE SIGN W1-3 IN LIEU OF SIGN W1-4.

LEGEND

- SIGN LOCATION
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED

LANE SHIFT / THREE LANE ROADWAY
TCP 11

ROLLING SLOWDOWN

Traffic Control Plan (TCP) 12

A rolling slowdown is a legitimate form of traffic control commonly practiced by the WSP, contractors and highway maintenance people. Their use is valuable for emergency, or ***very*** short duration, closures (e.g. to pick debris from the roadway, to push a blocking disabled to the shoulder, or to pull power lines across the roadway). The traffic control vehicles form a moving blockade which reduces traffic speeds and creates a large gap in traffic, or clear area, allowing very short term work to be accomplished without totally stopping the traffic.

Other traditional forms of traffic control should be considered first. If the closure is to be a scheduled operation, then the Regional Traffic Office needs to contacted to request a site specific, approved, Traffic Control Plan (TCP). The gap in traffic created by the rolling slowdown, and other traffic issues, would be addressed on an approved TCP. Also, use of WSP is encouraged whenever possible.

In the event of debris in the roadway, a blocking disabled vehicle, or other emergency, the use of experience and resources at hand, along with sound judgment and common sense, will suffice in lieu of an approved, site specific, TCP. TCP 12 on page 28 has been designed to present the basic information for performing a safe and effective rolling slowdown.

Equipment availability is a prime consideration. Before starting this operation, ensure there is at least one traffic control vehicle (with flashing amber lights) per lane to be slowed, ***and*** one vehicle to cover every point of access onto the 'rolling slowdown' segment of roadway. (Only during emergencies should less than one traffic control vehicle per lane be considered.) Truck mounted PCMS boards stating "Rolling Slowdown In Progress" are very helpful. **Be sure that every crew member participating is well briefed and knows what is needed from them. Good communications for this operation are essential!**

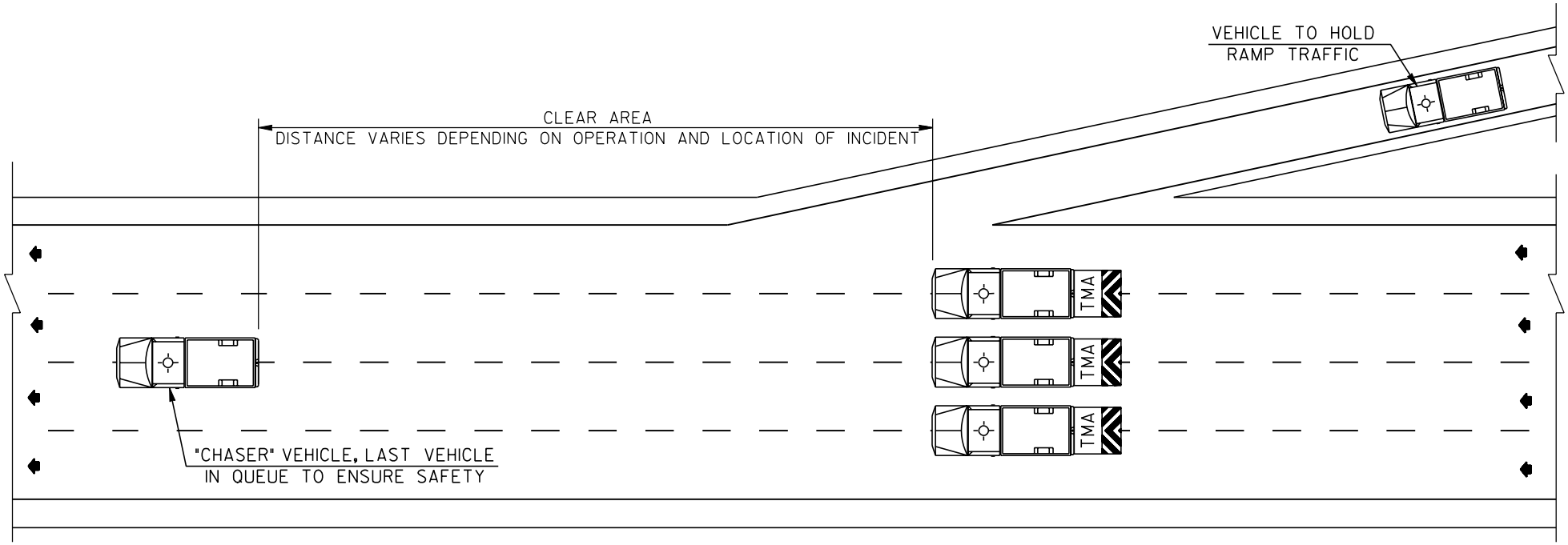
The traffic control vehicles leading the rolling slowdown must enter the roadway far enough upstream from the work operation site to allow a clear area in front of them to develop. The traffic control vehicles will work into position so that each lane is controlled. As in every other form of traffic control, sight distance is important, so that drivers are not surprised. While traveling at a fixed and reduced rate of speed, a gap in traffic must be created which is long enough to provide the estimated time needed for the work to be done.

A separate traffic control vehicle, "chaser vehicle", shall follow the slowest, or last, vehicle ahead of the blockade. When that last vehicle passes, the crew can begin the work operation.

All ramps and entrances to the roadway between the moving blockade and work operation must be temporarily closed using traffic control personnel. Each of those ramps must remain closed until the "all clear" signal is given by the crew doing the work, ***or***, until the front of the moving blockade passes the closed on-ramp(s).

Radio communications between the work crew and the moving blockade are needed so the speed of the blockade can be adjusted, if necessary, to increase or decrease the closure time. Release traffic only after you have confirmation that all workers and their vehicles are clear of the roadway.

THIS PLAN DEPICTS THE MINIMUM REQUIREMENTS TO PERFORM AN EMERGENCY ROLLING SLOWDOWN. IF THE SLOWDOWN IS, OR CAN BE, A PLANNED EVENT, THEN A SITE SPECIFIC TRAFFIC CONTROL PLAN SHOULD BE DEVELOPED AND APPROVED BY THE REGION TRAFFIC OFFICE PRIOR TO THE OPERATION OCCURRING.



(SAMPLE MESSAGE)

TRUCK MOUNTED PCMS	
1	2
SLOW OR STOPPED VEHICLES	DO NOT PASS
1.5 SEC	1.5 SEC

OPERATIONAL NOTES

1. ALL WORK VEHICLES SHALL USE WARNING BEACONS.
2. THE NUMBER OF VEHICLES SHOWN IS A MINIMUM. IF POSSIBLE USE ONE VEHICLE PER LANE DURING CLOSURE.
3. WSP SHALL BE NOTIFIED AND ON SITE WHEN AVAILABLE.
4. ALL ON-RAMP TRAFFIC SHALL BE STOPPED BY WSDOT VEHICLES.

LEGEND

TMA TRUCK MOUNTED ATTENUATOR

WARNING BEACON

TYPICAL (EMERGENCY)
ROLLING SLOWDOWN
TCP 12

MOBILE WORK ZONES

Traffic Control Plans (TCP's) 13 to 20

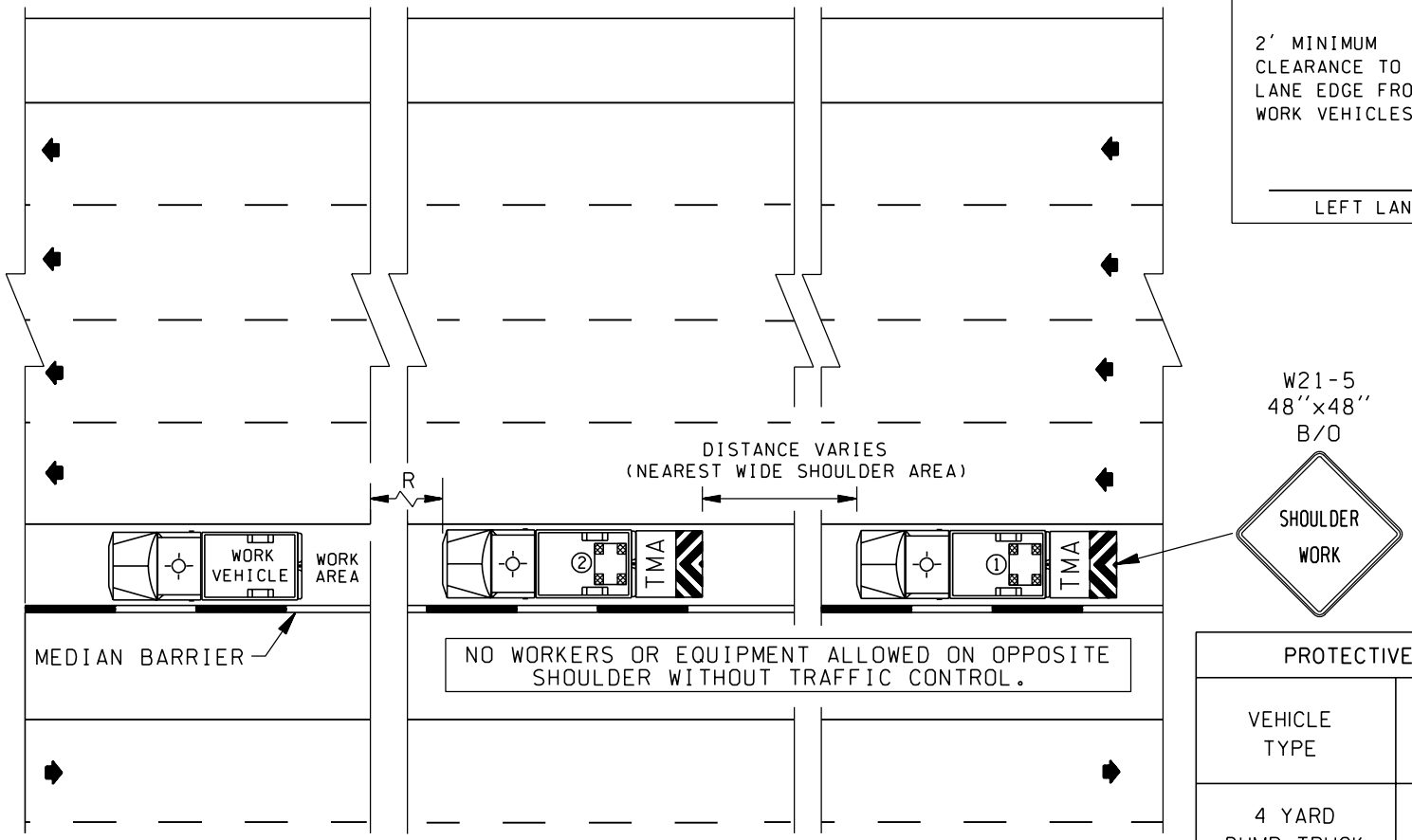
Mobile work zones are used for work activities that move along the road either intermittently or continuously. Frequent short stops, up to 15 minutes long, may be used for pothole patching, litter cleanup, herbicide spraying, lane marker replacement or other similar operations. Cones, truck mounted signs or Portable Changeable Message Signs (PCMS), warning lights and flaggers may be needed for these operations.

Mobile work zones also include slow moving operations where workers and equipment move along the road without stopping. Operations such as sweeping and paint striping are typical mobile operations. The warning signs move ahead with the work, usually mounted on a shadow vehicle. Truck mounted signs or PCMS, Truck Mounted Attenuator (TMA) and warning lights are some of the devices that may be used for moving operations. Messages for truck mounted PCMS's should conform to standard work messages whenever possible. Contact the Region Traffic Office Staff for assistance with selecting appropriate messages.

Mobile work zones are well suited to maintenance operations and can be an efficient way to accomplish many types of work, but due to the moving nature of these operations it is imperative that the crew is carefully coordinated. Careful consideration of traffic and roadway conditions as they relate to the specific operation must be done prior to starting work.

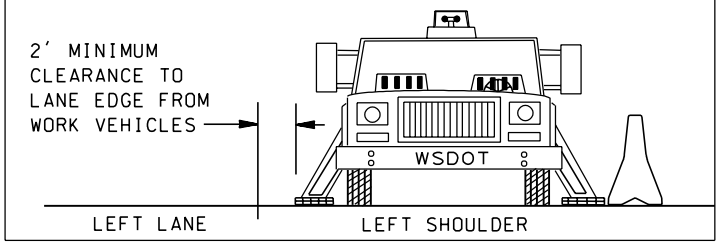
The following TCP's show typical examples of mobile work zones.

TYPICAL FREEWAY APPLICATION
(ACTUAL NUMBER OF LANES MAY VARY)



W21-5
48"x48"
B/O

LATERAL CLEARANCE DETAIL



(SAMPLE MESSAGE)

PCMS	
1	2
LEFT SHOULDER CLOSED	SLOW MOVING VEHICLES
1.5 SEC	1.5 SEC

Field locate in advance of lane closure. (TRUCK MOUNTED OR TRAILER MOUNTED OPTIONAL)

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*			
VEHICLE TYPE	VEHICLE WEIGHT (LBS)	STATIONARY	MOBILE
4 YARD DUMP TRUCK	24,000	100'	175'
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT * *VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.*			
TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.			

OPERATIONAL NOTES

1. SHADOW VEHICLE #1, MOUNT SHOULDER CLOSURE SIGN ON BACK OF VEHICLE. DO NOT OBSCURE SEQUENTIAL ARROW PANEL. MAINTAIN 1000' TO 1500' OF SIGHT DISTANCE TO APPROACHING TRAFFIC (TMA RECOMMENDED).
2. PROTECTIVE VEHICLE #2, POSITION VEHICLE TO PROVIDE PROTECTION OF CREW. MAINTAIN MINIMUM ROLL AHEAD DISTANCE (TMA RECOMMENDED).
3. 2' MINIMUM CLEARANCE REQUIRED BETWEEN LANE EDGE AND WORK VEHICLE. ADJACENT LANE MUST BE CLOSED IF ADDITIONAL CLEARANCE IS REQUIRED OR IF WORK ACTIVITIES ADVERSELY INFLUENCE TRAFFIC.
4. CONTACT OLYMPIC RADIO AT 253-536-6089 OR SEATTLE RADIO AT 206-440-4490 OR INDIVIDUAL REGION RADIO PRIOR TO WORK BEGIN AND END.

LEGEND

SEQUENTIAL ARROW PANEL - TYPE "B" (CAUTION MODE)

TMA — TRUCK MOUNTED ATTENUATOR

WARNING BEACON

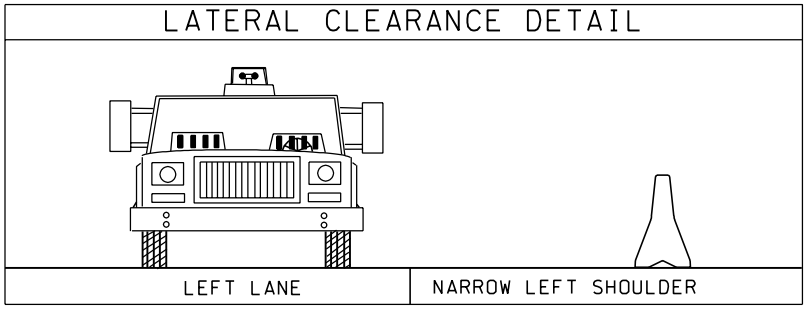
MOBILE FREEWAY OPERATION
LEFT SHOULDER CLOSED
TCP 13

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*			
VEHICLE TYPE	VEHICLE WEIGHT (LBS)	STATIONARY	MOBILE
4 YARD DUMP TRUCK	24,000	100′	175′
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT *• VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.*			
TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.			

(SAMPLE MESSAGE)

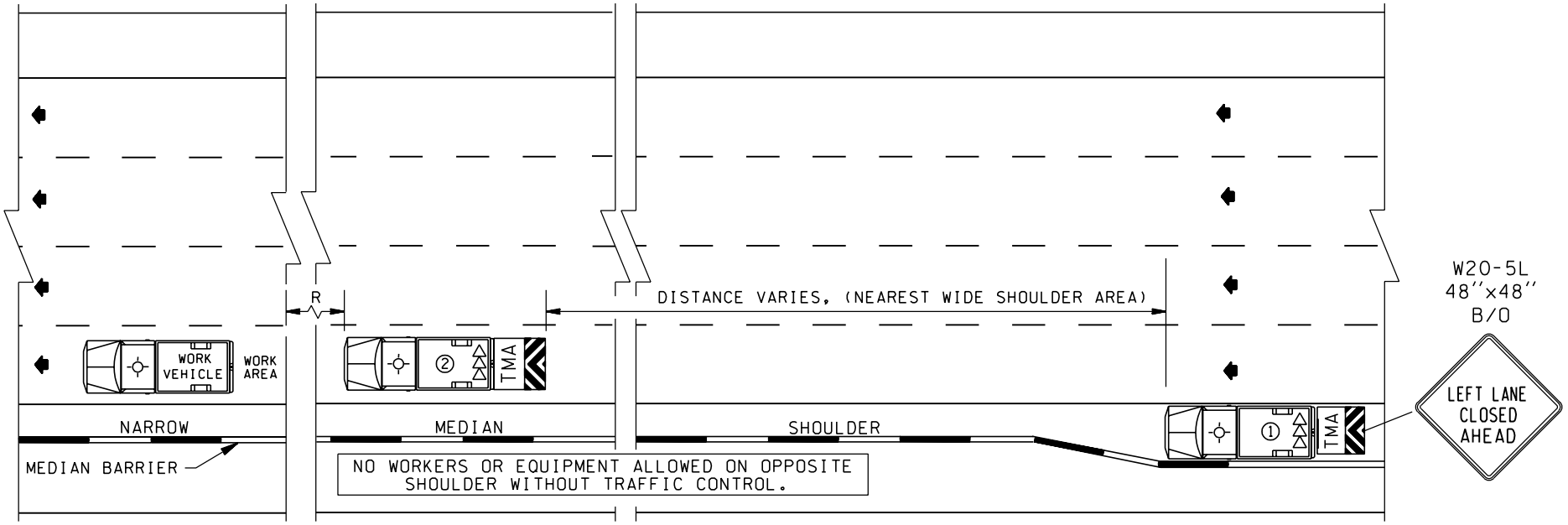
PCMS	
1	2
LEFT LANE CLOSED	MERGE RIGHT
1.5 SEC	1.5 SEC

Field locate in advance of lane closure. (TRUCK MOUNTED OR TRAILER MOUNTED OPTIONAL)



TYPICAL FREEWAY APPLICATION

(ACTUAL NUMBER OF LANES MAY VARY)



OPERATIONAL NOTES

1. SHADOW VEHICLE #1, MOUNT LANE CLOSURE SIGN ON BACK OF VEHICLE. DO NOT OBSCURE SEQUENTIAL ARROW PANEL. MAINTAIN 1000′ TO 1500′ OF SIGHT DISTANCE TO APPROACHING TRAFFIC (TMA RECOMMENDED).
2. PROTECTIVE VEHICLE #2, POSITION VEHICLE TO PROVIDE PROTECTION OF CREW. MAINTAIN MINIMUM ROLL AHEAD DISTANCE (TMA RECOMMENDED).
3. 2′ MINIMUM CLEARANCE REQUIRED BETWEEN LANE EDGE AND WORK VEHICLE. ADJACENT LANE MUST BE CLOSED IF ADDITIONAL CLEARANCE IS REQUIRED OR IF WORK ACTIVITIES ADVERSELY INFLUENCE TRAFFIC.
4. CONTACT OLYMPIC RADIO AT 253-536-6089 OR SEATTLE RADIO AT 206-440-4490 OR THE INDIVIDUAL REGION RADIO PRIOR TO WORK BEGIN AND END.

LEGEND

▷▷▷ SEQUENTIAL ARROW PANEL - TYPE ″B″ MIN.

TMA TRUCK MOUNTED ATTENUATOR

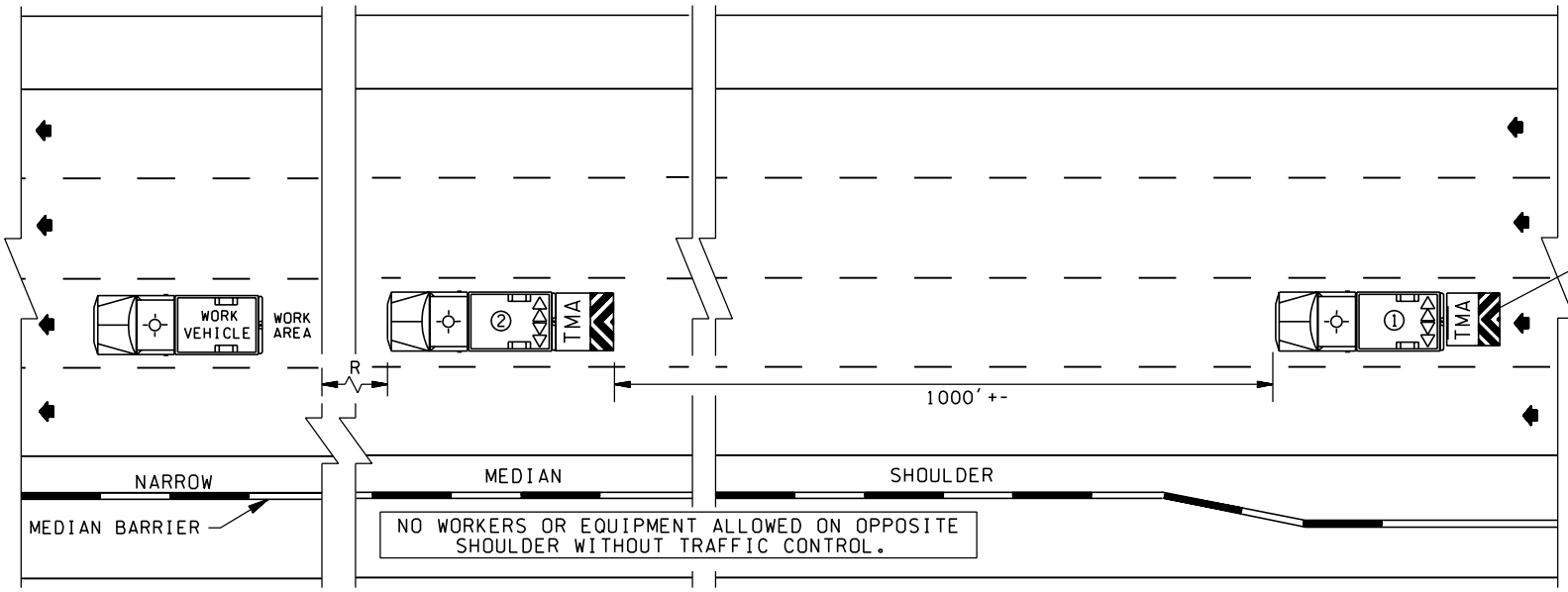
WARNING BEACON

MOBILE FREEWAY OPERATION
LEFT LANE CLOSURE
TCP 14

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*			
VEHICLE TYPE	VEHICLE WEIGHT (LBS)	STATIONARY	MOBILE
4 YARD DUMP TRUCK	24,000	100′	175′
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT *• VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.*			
TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.			

TYPICAL FREEWAY APPLICATION

(ACTUAL NUMBER OF LANES MAY VARY)



W20-5
48″x48″
B/O

OR

(SAMPLE MESSAGES)

PCMS	
1	2
THIS LANE CLOSED	SLOW MOVING VEHICLES
1.5 SEC	1.5 SEC

(Optional)
Field locate in advance of lane closure.

OPERATIONAL NOTES

1. SHADOW VEHICLE #1, MOUNT LANE CLOSURE SIGN ON BACK OF VEHICLE. DO NOT OBSCURE SEQUENTIAL ARROW PANEL. MAINTAIN 1000′ TO 1500′ OF SIGHT DISTANCE TO APPROACHING TRAFFIC (TMA RECOMMENDED).
2. PROTECTIVE VEHICLE #2, POSITION VEHICLE TO PROVIDE PROTECTION OF CREW. MAINTAIN MINIMUM ROLL AHEAD DISTANCE (TMA RECOMMENDED).
3. 2′ MINIMUM CLEARANCE REQUIRED BETWEEN LANE EDGE AND WORK VEHICLE. ADJACENT LANE MUST BE CLOSED IF ADDITIONAL CLEARANCE IS REQUIRED OR IF WORK ACTIVITIES ADVERSELY INFLUENCE TRAFFIC.
4. CONTACT OLYMPIC RADIO AT 253-536-6089 OR SEATTLE RADIO AT 206-440-4490 OR THE INDIVIDUAL REGION RADIO PRIOR TO WORK BEGIN AND END.

LEGEND

◁◁▷▷ SEQUENTIAL ARROW PANEL - TYPE ″B″ MIN.

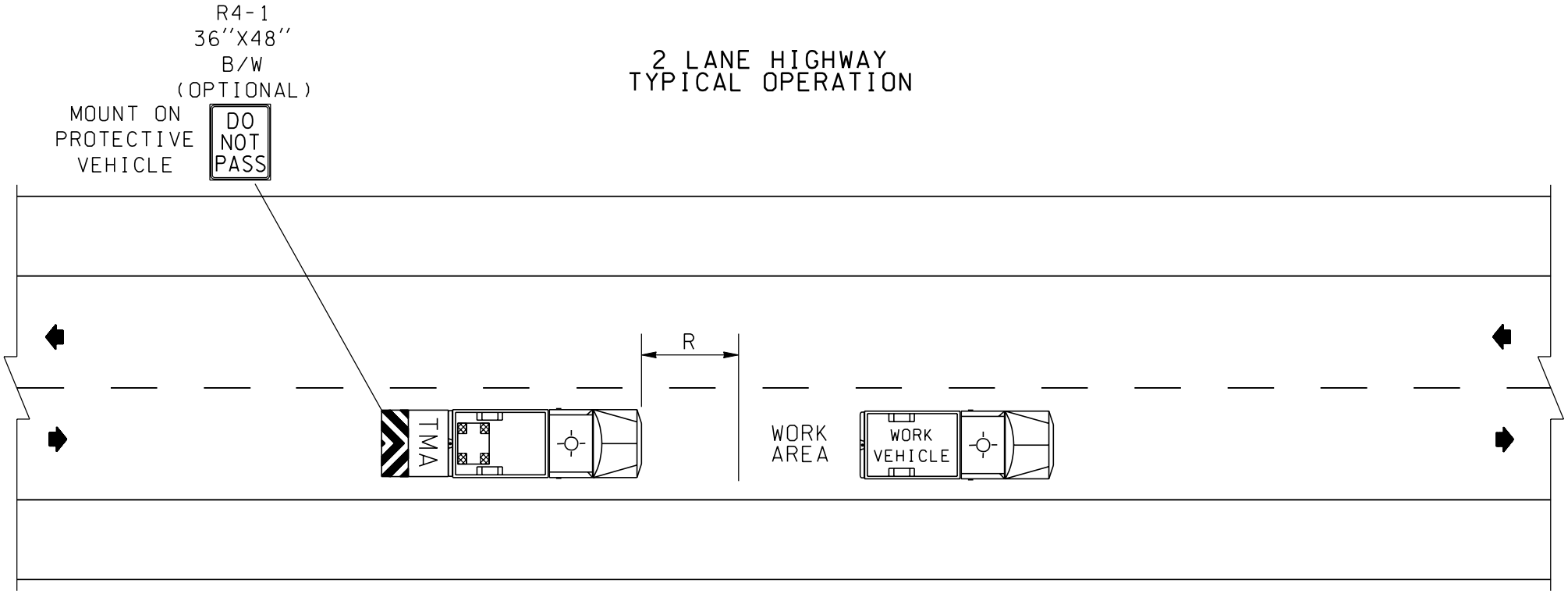
TMA TRUCK MOUNTED ATTENUATOR

WARNING BEACON

MOBILE FREEWAY OPERATION
MIDDLE LANE WORK AREA
TCP 15

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*			
VEHICLE TYPE	VEHICLE WEIGHT (LBS)	STATIONARY	MOBILE
4 YARD DUMP TRUCK	24,000	100'	175'
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT *• VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.*			
TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.			

2 LANE HIGHWAY TYPICAL OPERATION



OPERATIONAL NOTES

1. WORK VEHICLE AND PROTECTIVE VEHICLE SHALL USE WARNING BEACONS.
2. PROTECTIVE VEHICLE SHALL MAINTAIN 500'-1000' OF SIGHT DISTANCE TO APPROACHING TRAFFIC.
3. CONTACT REGION TRAFFIC OFFICE STAFF FOR ASSISTANCE WITH SPECIFIC IN LANE OPERATIONS SUCH AS STRIPING, FOG SEAL, ETC. THAT REQUIRE ADDITIONAL PLAN DETAILS.
4. THIS PLAN MAY BE IMPLEMENTED ON MULTI-LANE HIGHWAYS WITH LESS THAN 10,000 ADT.

LEGEND

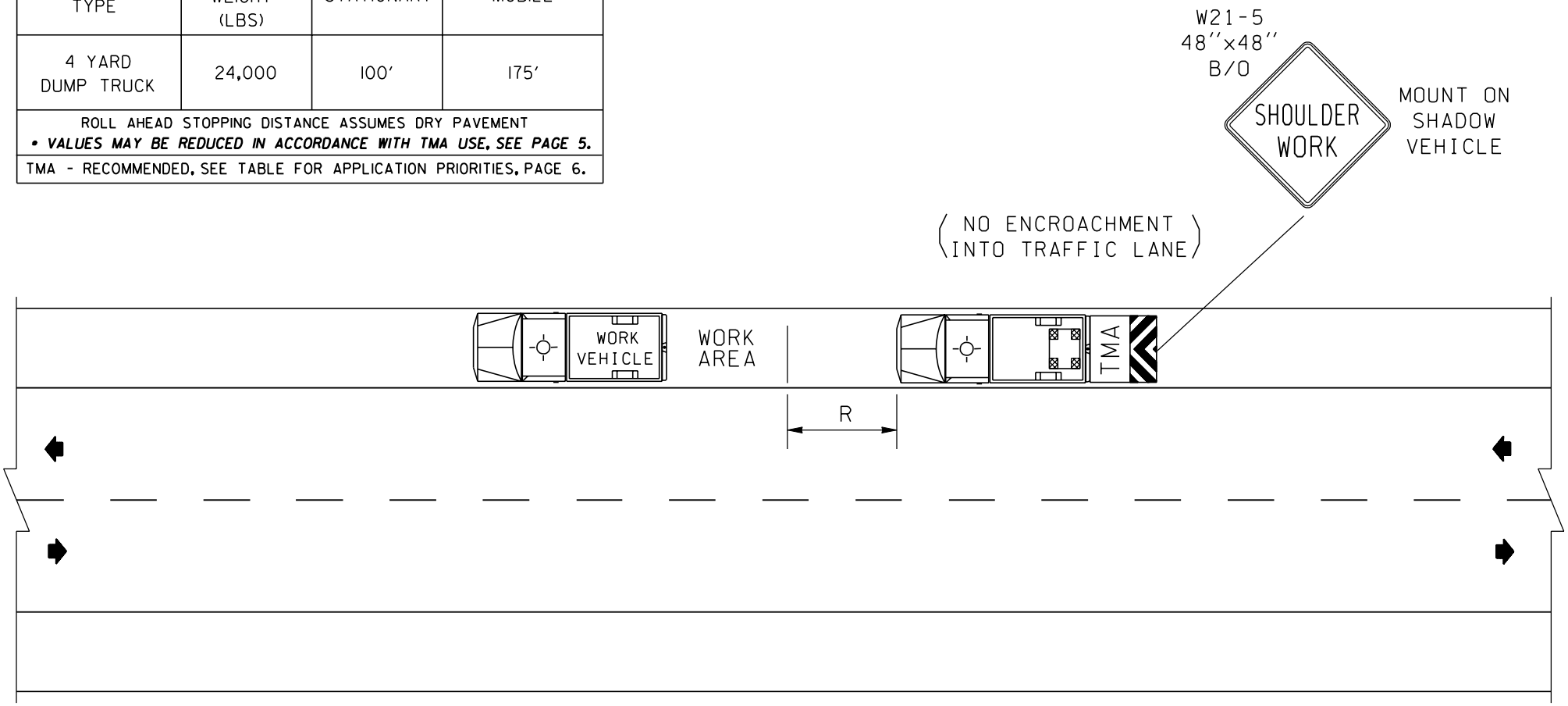
SEQUENTIAL ARROW PANEL - TYPE "B" (CAUTION MODE)

TMA — TRUCK MOUNTED ATTENUATOR

WARNING BEACON

MOBILE OPERATION LANE CLOSURE TCP 16

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*			
VEHICLE TYPE	VEHICLE WEIGHT (LBS)	STATIONARY	MOBILE
4 YARD DUMP TRUCK	24,000	100′	175′
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT * *VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.*			
TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.			



OPERATIONAL NOTES

1. WORK VEHICLE AND SHADOW/PROTECTIVE VEHICLE SHALL USE WARNING BEACONS.
2. SHADOW/PROTECTIVE VEHICLE RECOMMENDED- SHALL MAINTAIN 500′-1000′ OF SIGHT DISTANCE TO APPROACHING TRAFFIC.
3. THIS PLAN MAY BE IMPLEMENTED ON MULTI-LANE HIGHWAYS WITH LESS THAN 10,000 ADT.

LEGEND

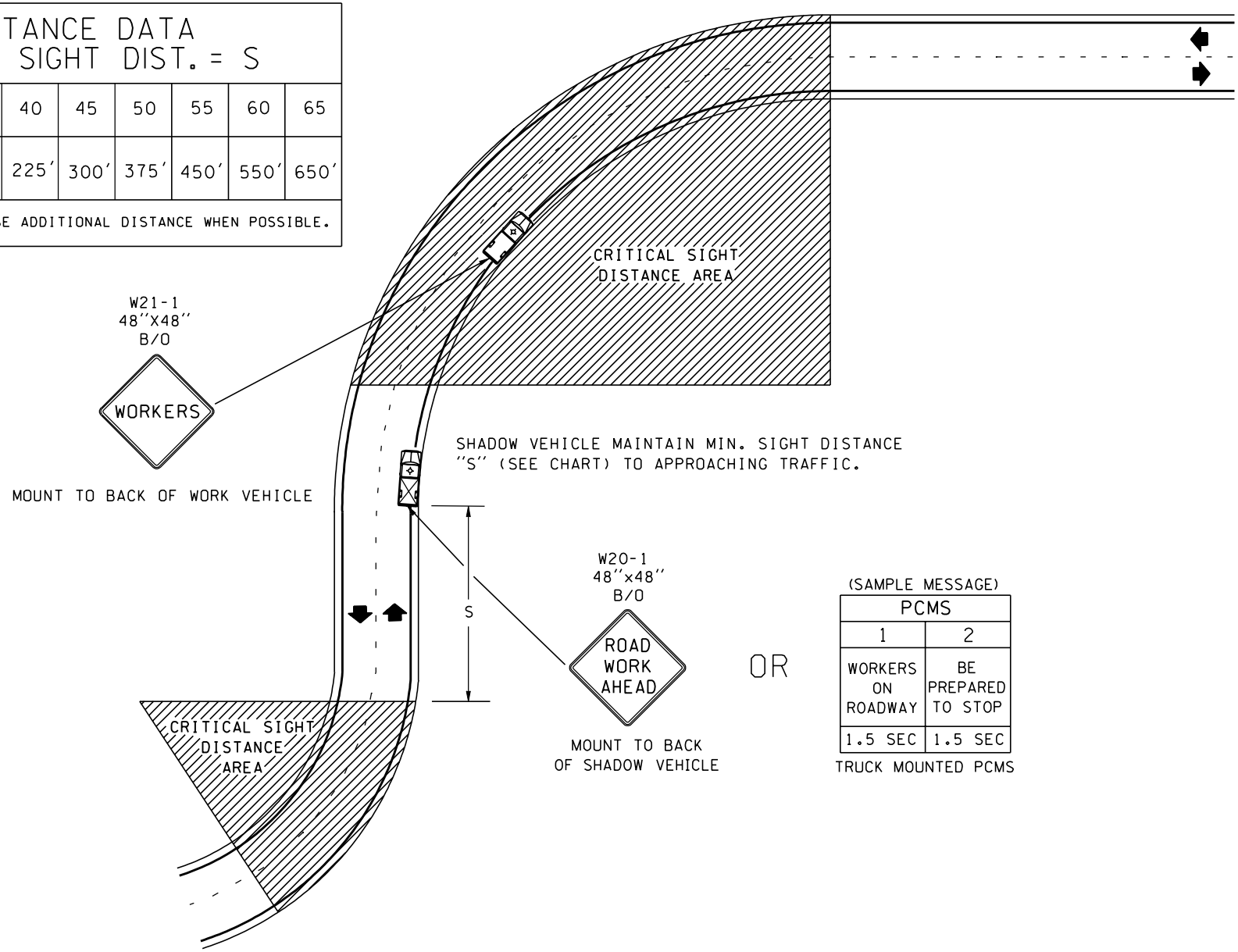
SEQUENTIAL ARROW PANEL - TYPE ″B″ (CAUTION MODE)

TMA — TRUCK MOUNTED ATTENUATOR

WARNING BEACON

MOBILE OPERATION
SHOULDER CLOSURE
TCP 17

SIGHT DISTANCE DATA MIN. STOPPING SIGHT DIST. = S									
SPEED LIMIT MPH	25	30	35	40	45	50	55	60	65
DISTANCE FEET	75′	100′	150′	225′	300′	375′	450′	550′	650′
DISTANCES SHOWN ARE MINIMUMS, USE ADDITIONAL DISTANCE WHEN POSSIBLE.									



OR

(SAMPLE MESSAGE)

PCMS	
1	2
WORKERS ON ROADWAY	BE PREPARED TO STOP
1.5 SEC	1.5 SEC

TRUCK MOUNTED PCMS

LEGEND

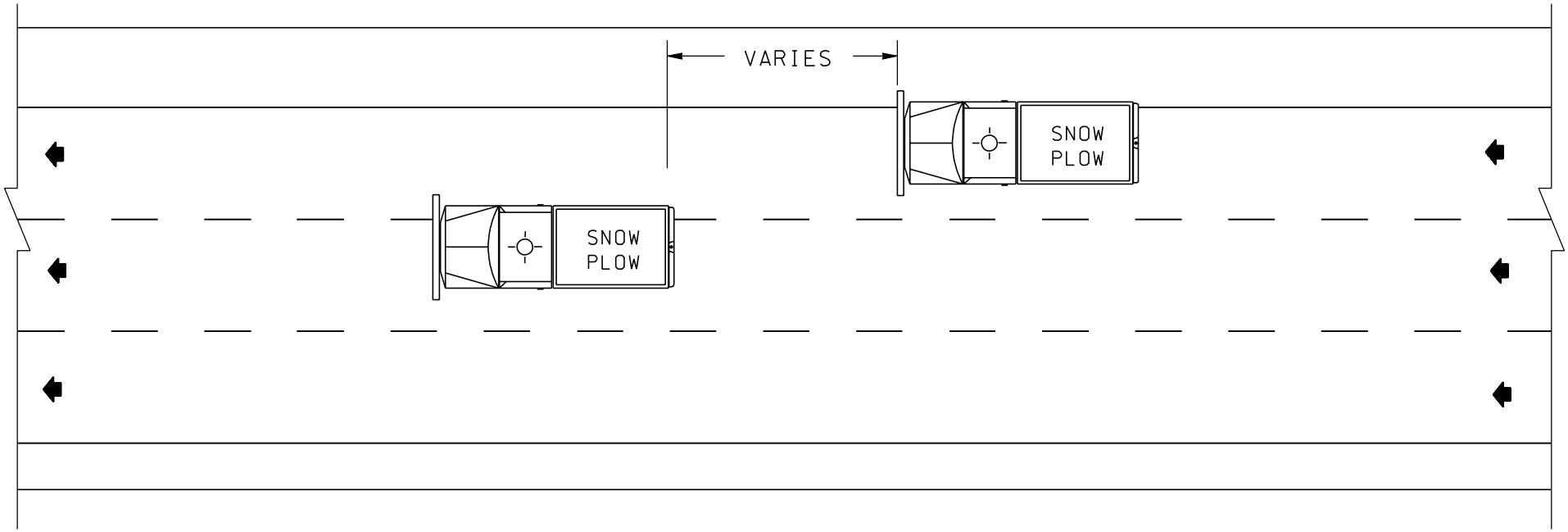
WORK VEHICLE WITH FLASHING AMBER WARNING BEACON

SHADOW VEHICLE WITH FLASHING AMBER WARNING BEACON (TMA RECOMMENDED, BUT NOT REQUIRED)

GENERAL NOTES

1. DAYLIGHT HOURS ONLY.
2. RADIO CONTACT BETWEEN WORK CREW AND SHADOW VEHICLE RECOMMENDED.

MOBILE SHOULDER OPERATION WITH LANE ENCROACHMENT
(RECOMMENDED FOR RURAL ROADWAYS WITH LESS THAN 10,000 ADT)
TCP 18



OPERATIONAL NOTES

1. WORK VEHICLES SHALL USE WARNING BEACONS.

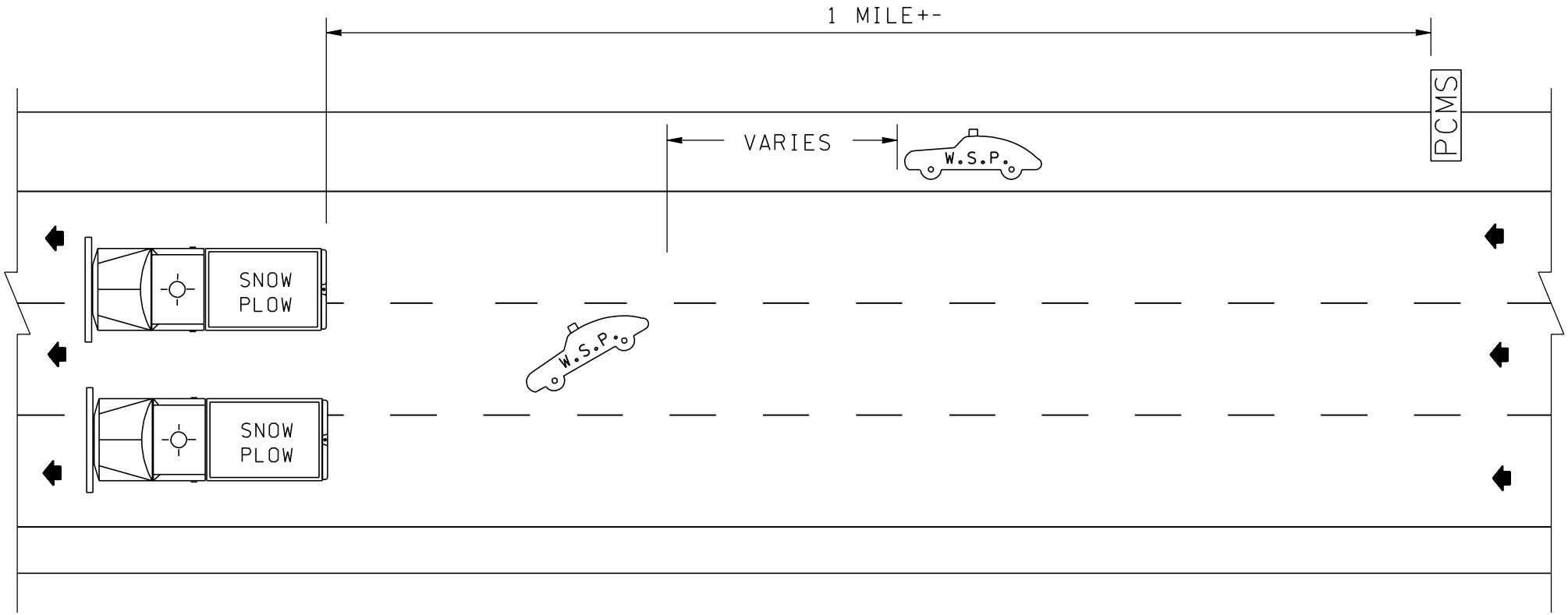
2. REFER TO MAINTENANCE MANUAL CHAPTER 8 SNOW AND ICE CONTROL, FOR OPERATIONAL REQUIREMENTS.

TANDEM SNOW PLOW OPERATIONS
MULTI-LANE FACILITIES
TCP 19

(SAMPLE MESSAGE)

PCMS	
1	2
AVALANCHE CONTROL AHEAD	PREPARE TO STOP
1.5 SEC	1.5 SEC

FIELD LOCATE 1 MILE (+-) IN ADVANCE OF LANE CLOSURE



OPERATIONAL NOTES

1. WORK VEHICLES SHALL USE WARNING BEACONS.
2. REFER TO MAINTENANCE MANUAL CHAPTER 8 SNOW AND ICE CONTROL, FOR OPERATIONAL REQUIREMENTS.
3. PCMS RECOMMENDED.
4. W.S.P. ASSISTANCE RECOMMENDED.

AVALANCHE CONTROL OPERATION
TOTAL ROAD CLOSURE
TCP 20

INTERSECTION OPERATIONS

Traffic Control Plans (TCP's) 21 to 23

Traffic control at intersections requires specific attention because traffic is usually in-bound from all directions. The traffic on all approaches needs to be given the same advance warning with the messages on the warning signs to be appropriate for the situation ahead of them. When an intersection is to be controlled by flaggers, always be sure that an existing signal does not give the drivers a conflicting message. For example, don't stop traffic when the signal is green. It is always best to turn off the signal during flagging operations.

The traffic control plans in this section show a pair of rather complex intersections. In general, use these examples as guidelines and prepare specific traffic control plans for the intersections you will be working in, showing the lanes and turning movements as they appear on the roadway.

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65
LENGTH (feet)	55	85	120	170	220	280	335	415	485

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*

TYPICAL LOADED PROTECTIVE VEHICLE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-65	100
		50-55	75
		45	50
2 TON CARGO TRUCK	15,000	60-65	150
		50-55	100
		45	75
1 TON CARGO TRUCK	10,000	60-65	200
		50-55	150
		45	100

* VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

MINIMUM TAPER LENGTH = L (FEET)

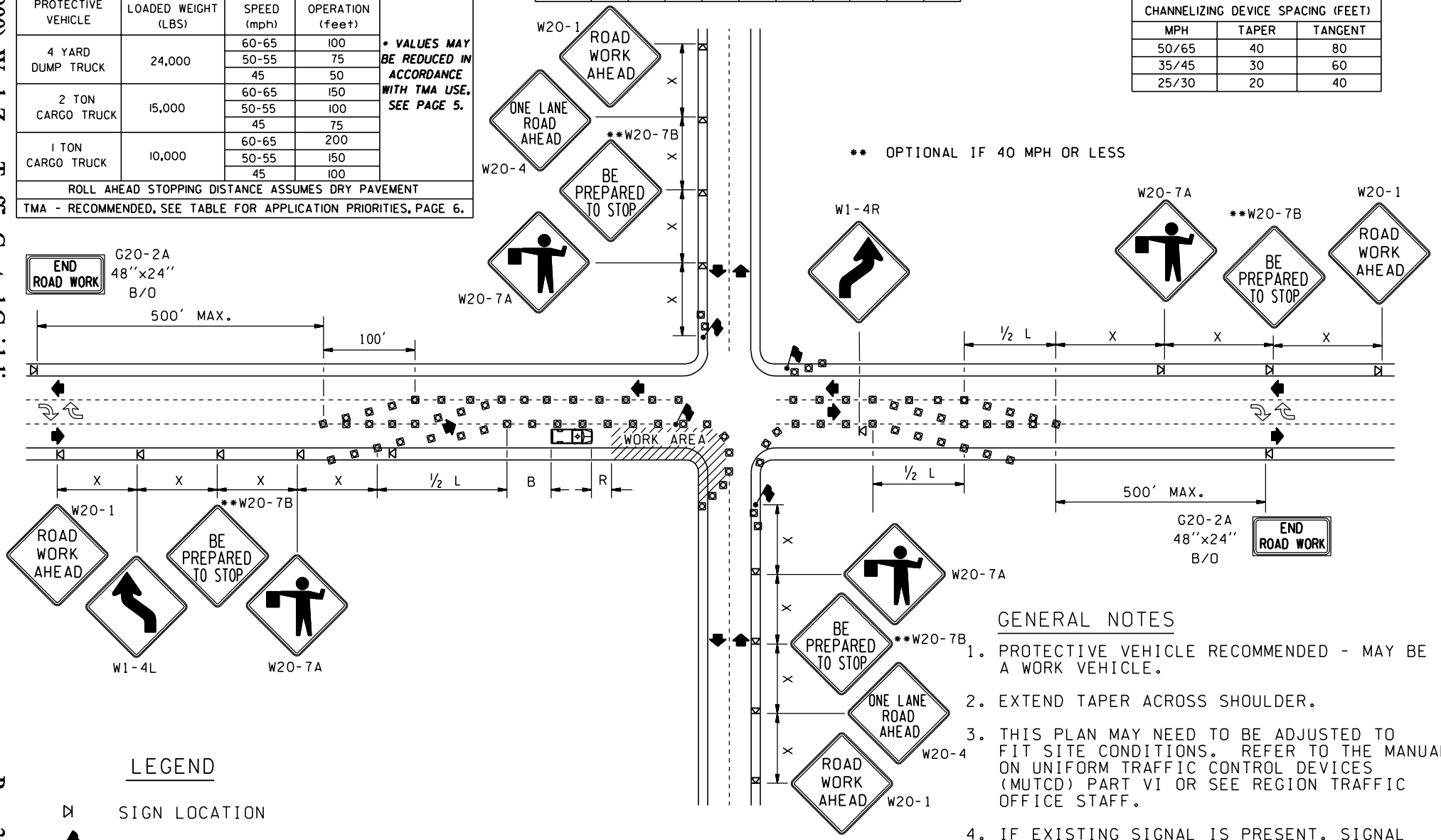
LANE WIDTH (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65
10	105	150	205	270	450	500	550	-	-
11	115	165	225	295	495	550	605	660	-
12	125	180	245	320	540	600	660	720	780

SIGN SPACING = X (FEET)

Rural Roads	45/65 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential & Business Districts	25/30 MPH	200'+-

All signs are 48" X 48" black on orange unless otherwise designated

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/65	40	80
35/45	30	60
25/30	20	40



GENERAL NOTES

1. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.
2. EXTEND TAPER ACROSS SHOULDER.
3. THIS PLAN MAY NEED TO BE ADJUSTED TO FIT SITE CONDITIONS. REFER TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) PART VI OR SEE REGION TRAFFIC OFFICE STAFF.
4. IF EXISTING SIGNAL IS PRESENT, SIGNAL SHALL BE SET TO "RED FLASH MODE" OR TURN OFF DURING FLAGGING OPERATIONS.
5. IF THE LANE SHIFT IS SHORT AND HAS SHARP CURVES (30 MPH OR LESS) USE SIGN W1-3 IN LIEU OF SIGN W1-4.

LEGEND

- SIGN LOCATION
- FLAGGING STATION
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE - RECOMMENDED

INTERSECTION LANE CLOSURE
TCP 21

BUFFER DATA

BUFFER SPACE = B

SPEED (MPH)	25	30	35	40	45	50	55	60	65
LENGTH (feet)	55	85	120	170	220	280	335	415	485

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R•

TYPICAL LOADED PROTECTIVE VEHICLE	TYPICAL VEHICLE LOADED WEIGHT (LBS)	POSTED SPEED (mph)	STATIONARY OPERATION (feet)
4 YARD DUMP TRUCK	24,000	60-65	100
		50-55	75
		45	50
2 TON CARGO TRUCK	15,000	60-65	150
		50-55	100
		45	75
1 TON CARGO TRUCK	10,000	60-65	200
		50-55	150
		45	100

• VALUES MAY BE REDUCED IN ACCORDANCE WITH TMA USE, SEE PAGE 5.

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

TMA - RECOMMENDED, SEE TABLE FOR APPLICATION PRIORITIES, PAGE 6.

MINIMUM TAPER LENGTH = L (FEET)

LANE WIDTH (feet)	Posted Speed (mph) 25	30	35	40	45	50	55	60	65
10	105	150	205	270	450	500	550	–	–
11	115	165	225	295	495	550	605	660	–
12	125	180	245	320	540	600	660	720	780

SIGN SPACING = X (FEET)

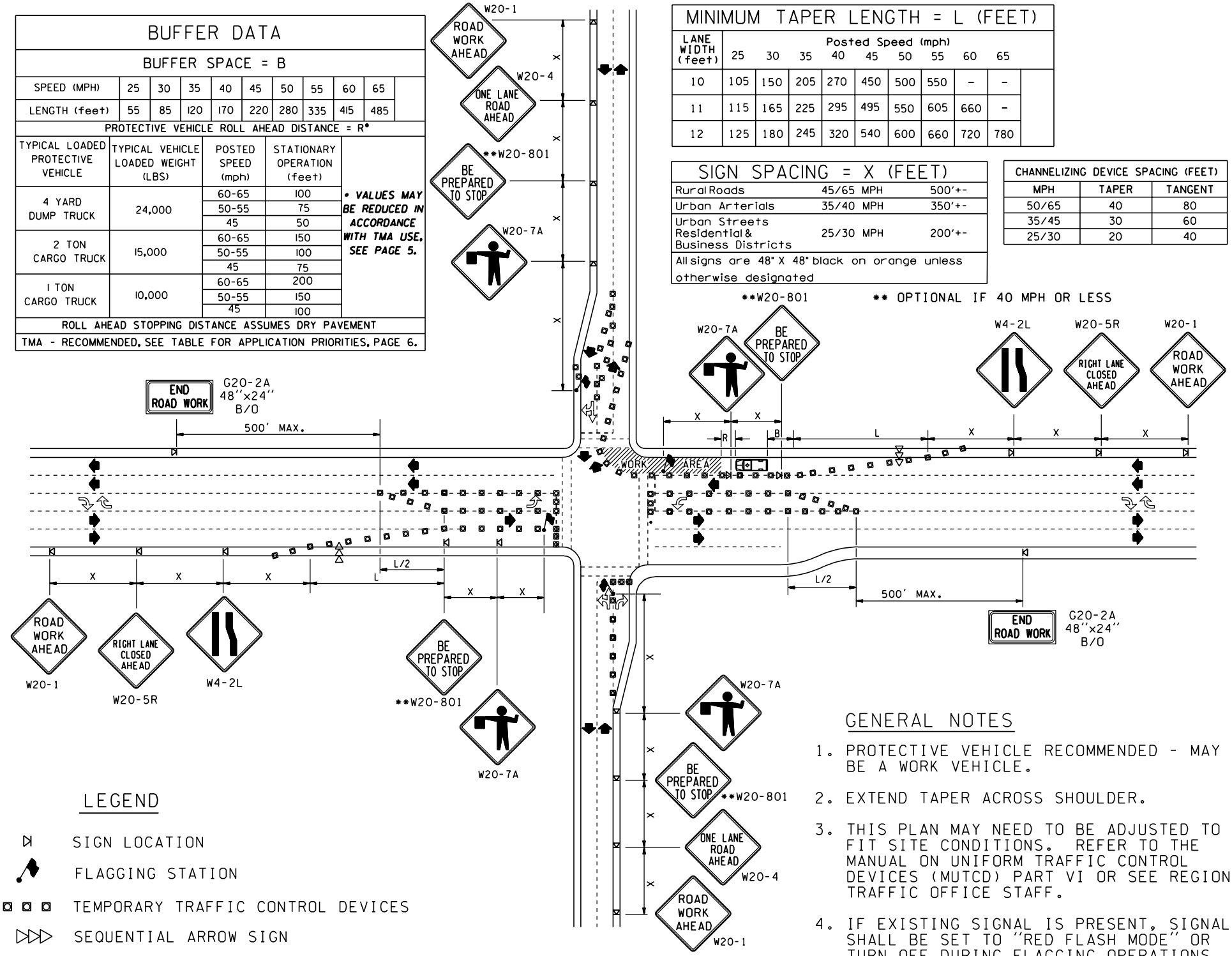
Rural Roads	45/65 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential & Business Districts	25/30 MPH	200'+-

All signs are 48" X 48" black on orange unless otherwise designated

CHANNELIZING DEVICE SPACING (FEET)

MPH	TAPER	TANGENT
50/65	40	80
35/45	30	60
25/30	20	40

** OPTIONAL IF 40 MPH OR LESS



LEGEND

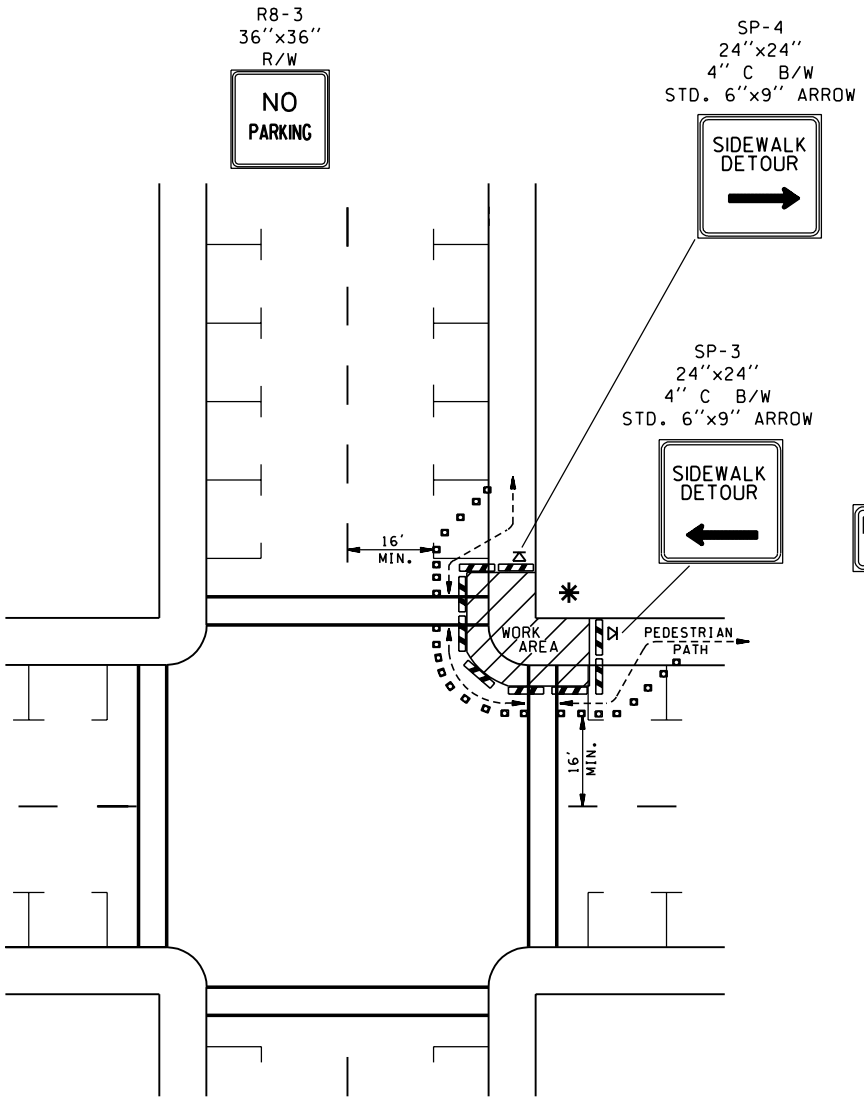
- SIGN LOCATION
- FLAGGING STATION
- TEMPORARY TRAFFIC CONTROL DEVICES
- SEQUENTIAL ARROW SIGN
- PROTECTIVE VEHICLE - RECOMMENDED

GENERAL NOTES

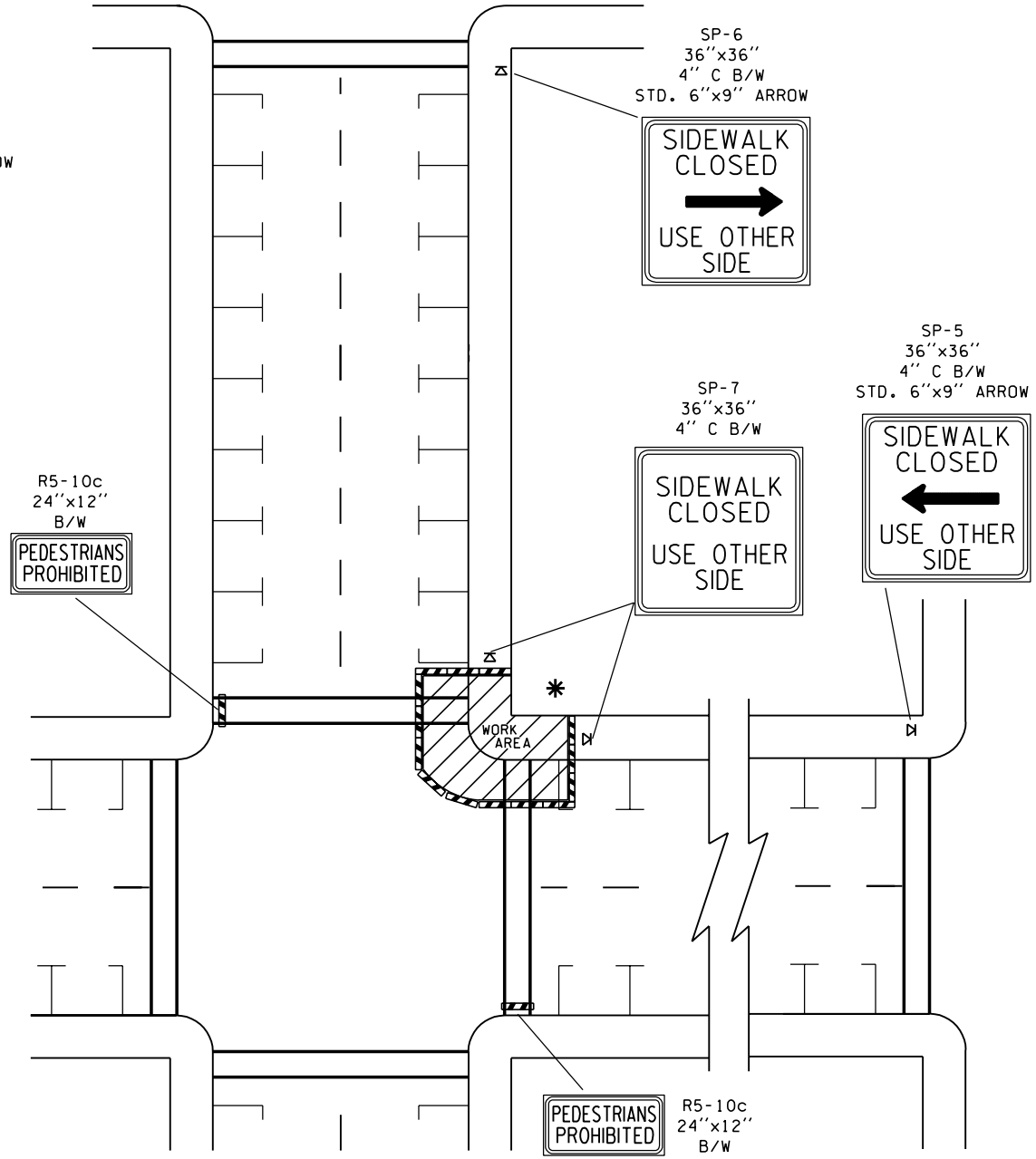
1. PROTECTIVE VEHICLE RECOMMENDED - MAY BE A WORK VEHICLE.
2. EXTEND TAPER ACROSS SHOULDER.
3. THIS PLAN MAY NEED TO BE ADJUSTED TO FIT SITE CONDITIONS. REFER TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) PART VI OR SEE REGION TRAFFIC OFFICE STAFF.
4. IF EXISTING SIGNAL IS PRESENT, SIGNAL SHALL BE SET TO "RED FLASH MODE" OR TURN OFF DURING FLAGGING OPERATIONS.

INTERSECTION LANE CLOSURE
TCP 22

✱ INSTALL ON TYPE II BARRICADES THROUGHOUT THE WORK AREA 24 HOURS PRIOR TO IMPLEMENTING TRAFFIC CONTROL. PRIOR NOTIFICATION OF POLICE DEPARTMENT REQUIRED.



PEDESTRIAN DETOUR
(NONWORKING HOURS)



PEDESTRIAN DETOUR
(WORKING HOURS)

LEGEND

- SIGN LOCATION
- TEMPORARY TRAFFIC CONTROL DEVICES
- TYPE II BARRICADE

INTERSECTION PEDESTRIAN
TRAFFIC CONTROL
TCP 23

GENERAL NOTES

1. CONTROLS SHOWN ARE FOR PEDESTRIAN TRAFFIC ONLY.
2. USE WARNING LIGHTS ON BARRICADES.

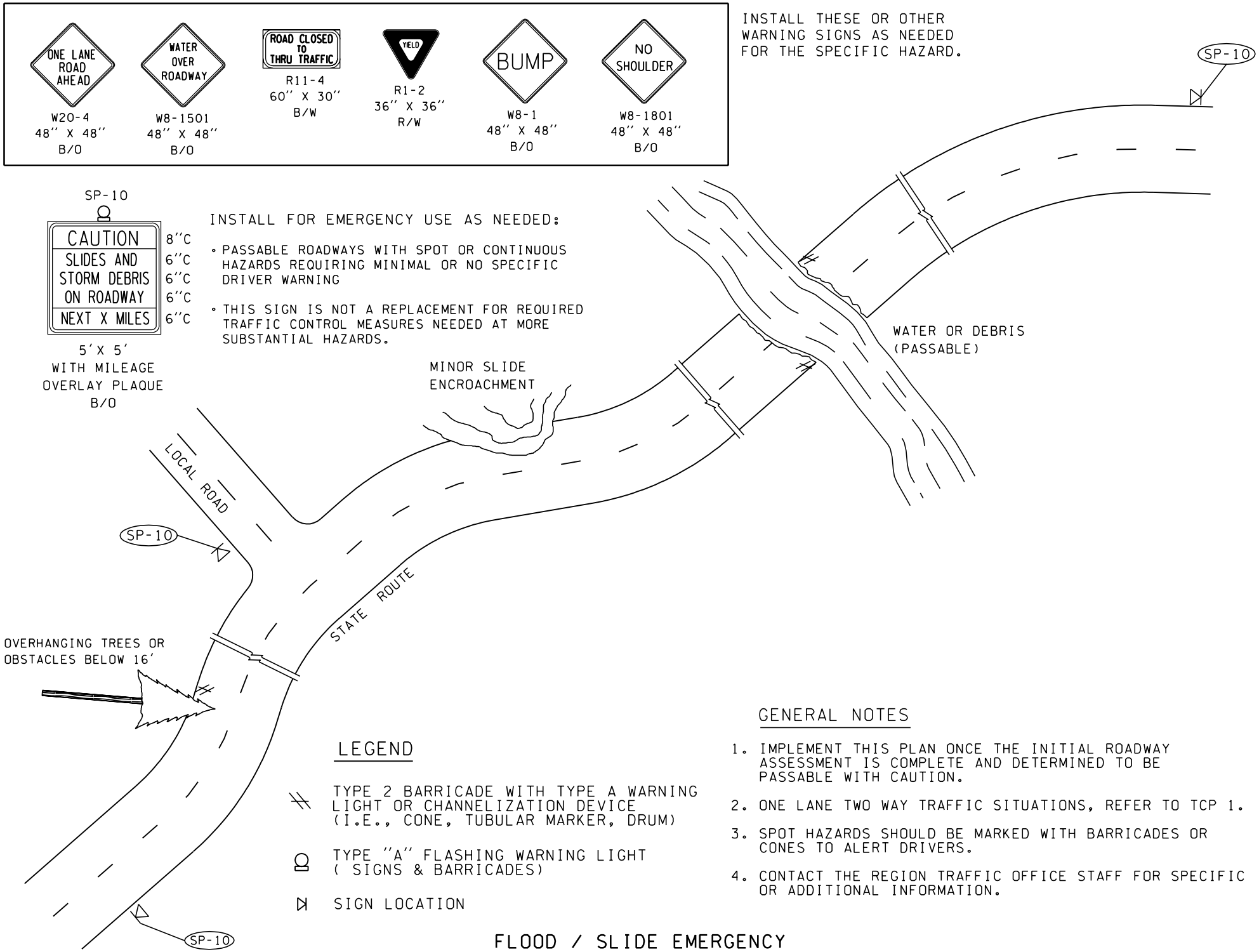
EMERGENCY OPERATIONS

Traffic Control Plan (TCP) 24

The immediate response to an emergency situation must, by necessity, make use of whatever devices and equipment are available. Assistance from the Washington State Patrol and WSDOT Incident Response Team may be appropriate. The use of flares is allowed unless flammable material is present.

Implement the appropriate traffic control plan (lane closure, etc.) if the situation is expected to last longer than 60 minutes. This allows for short duration operation, while traffic control assistance arrives.

Response to an emergency situation is inherently more dangerous than planned situations. Do not expose yourself to a life threatening situation. Wait for assistance and protect yourself at all times.



FLOOD / SLIDE EMERGENCY
TCP 24

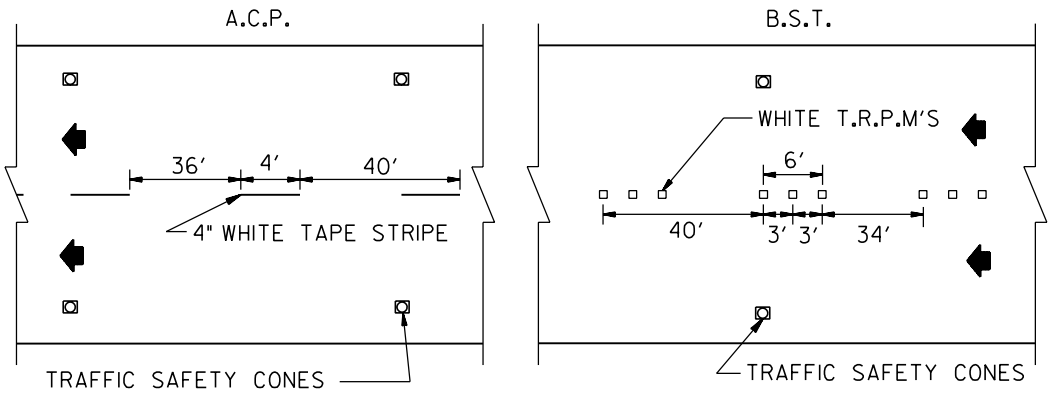
SPECIAL DETAILS AND TCP REFERENCE CHART

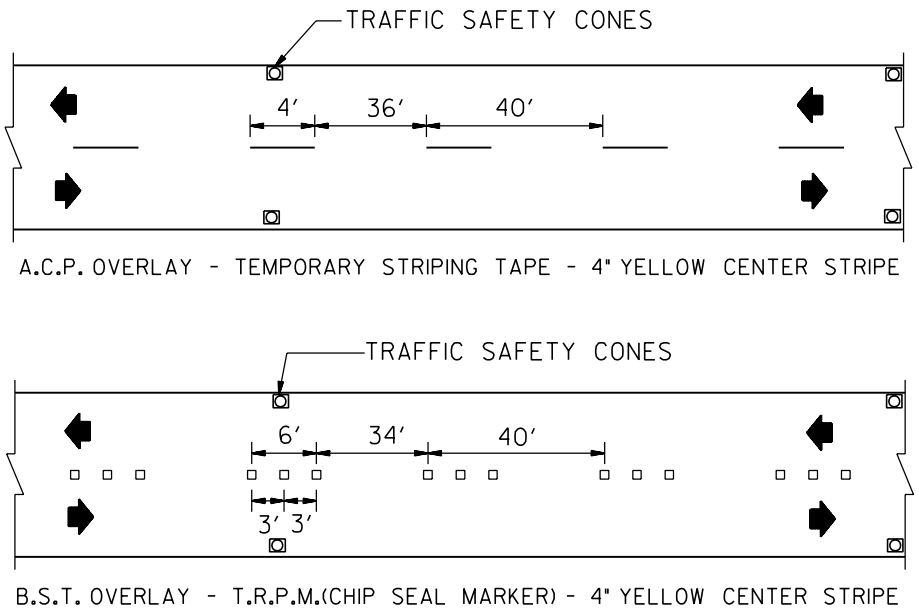
Traffic Control Details (TCD's) 1 to 4

The following details show the placement of certain signs, channelizing devices, and pavement markings which are difficult to show on other traffic control plans. A detail is also included as a guideline for signing a chip seal operation (TCD 4) and this includes a reduced speed limit. Be sure to include specific warning signs along with any reduction in the legal speed so the drivers have proper expectancy and know why they are being asked to slow down.

The TCP Reference Chart (TCD 3) serves as a handy checklist to see which traffic control plans <u>might be</u> useful for particular kinds of operations.

WORK OPERATIONS THAT REMOVE OR OBSCURE EXISTING PAVEMENT MARKINGS MUST PROVIDE FOR TEMPORARY MARKINGS UNTIL THE PERMANENT MARKINGS ARE APPLIED. PERMANENT MARKINGS SHALL BE INSTALLED WITHIN 2 WEEKS. THE DETAILS BELOW SHOW SOME COMMON APPLICATIONS. CONTACT THE REGION TRAFFIC OFFICE STAFF FOR ASSISTANCE WITH MORE COMPLEX SITUATIONS.





TEMPORARY EDGE STRIPES ARE NOT REQUIRED FOR THE ABOVE SITUATIONS. TEMPORARY ROADSIDE DELINEATION WITH CHANNELIZATION DEVICES SHOULD BE CONSIDERED, BUT ARE OPTIONAL. DO NOT USE A "SKIP" PATTERN OF TAPE STRIPE OR T.R.P.M.'S TO SIMULATE AN EDGE STRIPE.

CHANNELIZATION DEVICE SPACING - TANGENT 200′+-
CURVES 100′+-
TAPERS ½ L

T.R.P.M. = TEMPORARY RAISED PAVEMENT MARKER

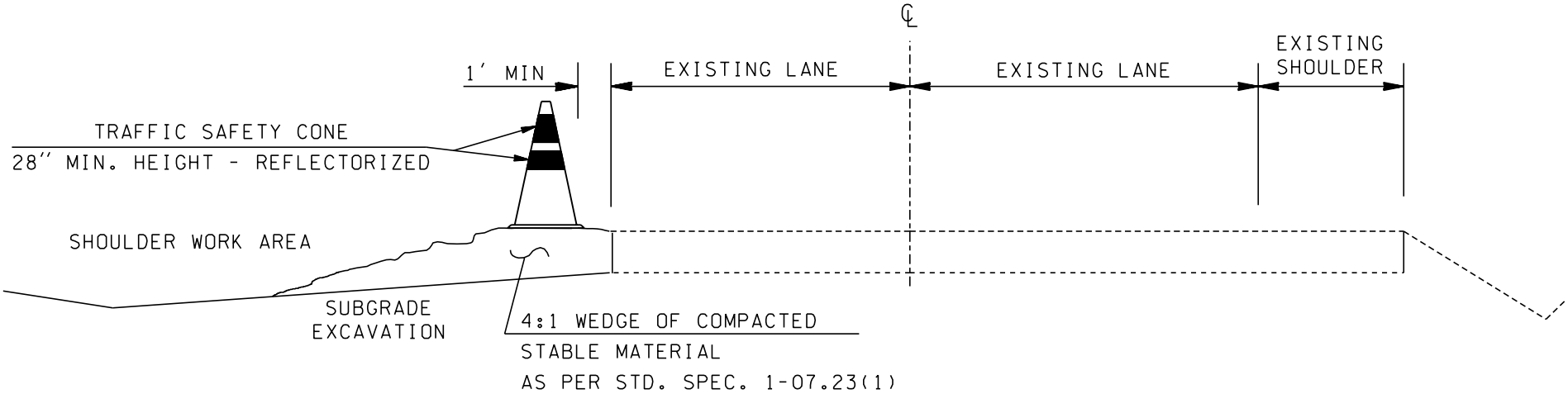
TEMPORARY PAVEMENT MARKING DETAILS
TCD 1

WARNING SIGNS

LOCATE AS NEEDED FOR SITE CONDITIONS
TO SUPPLEMENT WARNING SIGNS

W21-801
48"X48"
B/O

W8-1801
48"X48"
B/O



OPERATIONAL NOTES

1. SHOULDER EXCAVATION SHALL BE LIMITED TO ONE SIDE OF ROADWAY AT A TIME.

SHOULDER WORK AREA PROTECTION
NON-WORKING HOURS
TCD 2

TCP REFERENCE CHART

FOR SELECTED WORK OPERATIONS

WORK OPERATION	STATIONARY AND SHORT DURATION	MOBILE	SUGGESTED TRAFFIC CONTROL PLAN*
Re-lamp		X	13 & 17
Light Standard Repair	X		2, 4, & 5
Rewire	X		2, 4, & 5
VACTOR		X	13 & 17
Sweeping		X	13 & 17
Striping		X	14, 15 & 16
RPM's		X	14, 15 & 16
Sign Installation	X	X	4, 5, & 14
Pot Hole Repair	X	X	1, 2, & 14
Paving / Chip Seal	X		1, 2, & TCD 4
Bridge Inspection	X	X	2, 13, & 14
EMERGENCY	X	X	24

LEGEND

X=Applies

Definitions:

Stationary--------- Operation longer than 1hour.
Short Duration----- Operations of 60 minutes or less.
Mobile---------- Frequent short stops up to 15 minutes or continuously slow moving.
Emergency--------- Mobile to Stationary, but unexpected (Call for traffic control if work is expected to last longer than 60 minutes. This allows for 60 minutes as a short duration operation while traffic control assistance arrives).

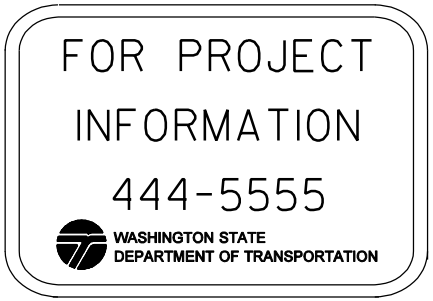
* Others may apply, or a site specific plan may be appropriate.

TCP REFERENCE CHART
TCD 3

POSTED SPEED	DECELERATION LENGTH NEEDED TO REACH LISTED ADVISORY SPEED - MPH = D				
	10	20	30	40	50
65	650	625	575	500	375
60	575	550	500	400	300
55	500	475	400	300	--
50	425	400	325	225	--
45	350	300	250	--	--
40	275	250	175	--	--
35	200	175	--	--	--
30	150	100	--	--	--

SIGN SPACING = X (FEET)		
Rural Roads	45/65 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Rural Roads Urban Streets Residential & Business Districts	25/30 MPH	200'+-
All signs are 48" X 48" black on orange unless otherwise designated		

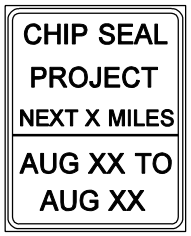
R4-1
36"X48"
B/W



G24-501
48"X36"
B/O

INSTALL AS REQUIRED THROUGHOUT PROJECT LIMITS

6" C
6" C
6" C
6" C
6" C



SP-1
48"X60"
B/O

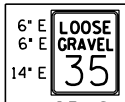
OR

(SAMPLE MESSAGE)

PCMS	
1	2
CHIP SEAL PROJECT	BEGINS AUG XX TO AUG XX
1.5 SEC	1.5 SEC

PLACE SIGN TO INDICATE LEGAL TO RESUME SPEED

6" E
6" E
14" E

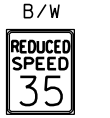


SP-2
36"X48"
B/O

OR OTHER APPROPRIATE WARNING SIGN AS NEEDED FOR HAZARD AT THE WORK SITE. SEE TCP'S FOR RECOMMENDED SIGNS.

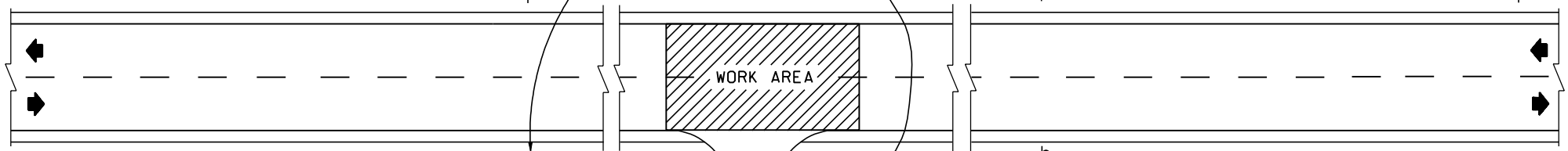
R2-1
36"X48"
B/W

R2-5b
36"X48"
B/W



W20-1

* X D X



X D X *

W20-1

R2-5b
36"X48"
B/W

R2-1
36"X48"
B/W

W20-1

X

PLACE SIGN TO INDICATE LEGAL TO RESUME SPEED

ALL SPEED REDUCTIONS MUST BE APPROVED BY THE REGION TRAFFIC ENGINEER PRIOR TO IMPLEMENTATION.

* CONTINUE SIGNS AS NEEDED BASED ON REQUIRED HAZARD WARNING AS SHOWN ON THE APPROPRIATE TCP.

LEGEND

SIGN LOCATION

WORK AREA LIMITS

TYPICAL SPEEDZONE DETAIL
CHIP SEAL PROJECTS
TCD 4

GENERAL NOTES

1. REFER TO LANE CLOSURE PLANS FOR LANE CLOSURE DETAILS.
2. THE TABLES PROVIDED ARE AN AID FOR DETERMINING SIGN LOCATIONS. THE VALUES CONTAINED IN THE TABLES SHOULD BE CONSIDERED MINIMUMS AND APPLIED IN THE FIELD WITH RESPECT TO SITE CONDITIONS.
3. CONTACT THE REGION TRAFFIC ENGINEER FOR ADDITIONAL GUIDANCE IF NEEDED DUE TO UNUSUAL SITE CONDITIONS OR TRAFFIC CHARACTERISTICS.
4. REGULATORY SPEED LIMIT SIGNING IS NOT A SUBSTITUTE FOR WORK ZONE SIGNING REQUIRED TO WARN MOTORISTS.
5. SPEED ZONE SIGNING SHALL ONLY REMAIN IN PLACE FOR AS LONG AS THE REDUCED SPEED CONDITION APPLIES.
6. SPEED LIMIT REDUCTION SHALL CONFORM TO RCW 47.48.020.
7. CONTACT THE REGION TRAFFIC OFFICE STAFF FOR SPECIAL SIGN ORDERS, SPEED REDUCTION NOTICES, ETC.

Notes