Chapters 7 and 8 of the Maintenance Manual

TRAFFIC MANAGEMENT AND PROTECTION OF WORKERS

DIVISION OF MAINTENANCE

FEBRUARY 2023

Caltrans

CHAPTER *7*
Traffic Management

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7.01 Introduction

7.01.01 Chapter Contents and Resources

This chapter contains information relevant to providing an overview of policies, expectations, and strategies regarding traffic and safety management.

Personnel responsible for maintenance operations on highways where non-motorized (bicycle/pedestrian) travel is permitted should ensure that bicyclists and pedestrians have a safe and reasonably direct route through or around the work area.

Additional information about non-motorized considerations can be found in:

- Flexible Pavement – Chapter A
- Vegetation Control – Chapter C2
- Drainage Facilities – Chapter C5
- Litter & Debris – Chapter D1

Refer to Protection of Workers – Chapter 8 for the following:

- Protective Vehicles – Chapter 8.11
- MAZEEP (Maintenance Zone Enhanced Enforcement Program) – Chapter 8.12
- Amber Lights – Chapter 8.15

For additional information see the following references:

- Joint Operations Policy Statement https://traffic.onramp.dot.ca.gov/downloads/traffic/files/otm/2005-12-29_CHP-CT_Joint_Operational_Policy_Statements.pdf
- Maintenance Policy Directive MPD-18-01 "Division of Maintenance – Use of Road Flares" https://maintenance.onramp.dot.ca.gov/downloads/maintenance/files/maint_admin/directives_memos/MPD-18-01-Use-of-Road-Flares.pdf
- Caltrans Memorandum, "Perchlorate Best Management Practices" (May 2006) https://env.onramp.dot.ca.gov/downloads/env/managedfiles/h003.pdf
- California Manual on Uniform Traffic Control Devices https://dot.ca.gov/programs/safety-programs/camutcd
- Flagging Traffic https://dot.ca.gov/-/media/dot-media/programs/safety-programs/documents/ca-mutcd/rev6/camutcd2014-part6-rev6.pdf

7.01.02 Definitions

CA - Signs referenced with (CA) in this chapter indicate a California sign code. Otherwise, the sign code referenced is a federal sign code.
CA MUTCD – California Manual on Uniform Traffic Control Devices
CHP – California Highway Patrol
CMS – Changeable Message Sign
CPR – Cardiopulmonary Resuscitation
CSOP – Code of Safe Operating Practices
CVC – California Vehicle Code
FAS – Flashing Arrow Sign
FHWA – Federal Highway Administration

LED – Light Emitting Diode
MAZEEP – Maintenance Zone Enhanced Enforcement Program
MUTCD – Manual on Uniform Traffic Control Devices
PCMS – Portable Changeable Message Sign
SHC – Streets and Highway Code
TMC – Traffic Management Center
TTC - Temporary Traffic Control
TTY – Text Telephone
VC – Vehicle Code

Freeway - a divided highway with full control of access. As per California Vehicle Code (CVC) 332, "Freeway" is a highway in respect to which the owners of abutting lands have no right or easement of access to or from their abutting lands or in respect to which such owners have only limited or restricted right or easement of access.

Expressway - a divided highway with partial control of access. As per CVC 314, an "expressway" is a portion of highway that is part of either of the following:

(a) An expressway system established by a county under Section 941.4 of the Streets and Highways Code

(b) An expressway system established by a county before January 1, 1989, as described in subdivision (g) of Section 941.4 of the Streets and Highways Code

Multi-Lane - more than one lane moving in the same direction.
A multi-lane street, highway, or roadway has a basic cross-section comprised of two or more through lanes in one or both directions.
A multi-lane approach has two or more lanes moving toward the intersection, including turning lanes.

Conventional Road - a street or highway other than a low-volume road (as defined in the Manual on Uniform Traffic Control Devices "MUTCD", Section 5A.01), expressway, or freeway.

7.01.03 References and Hyperlinks

Some of the references found in this chapter have hyperlinks that connect to Caltrans intranet pages which are not displayable to the general public. Until such time that the specific reference becomes available on the internet, the user will have to contact their district maintenance engineer or the appropriate Headquarters division to inquire about the availability of the reference.

7.01.04 Chapter Contact

This chapter of the Maintenance Manual is maintained by the Maintenance Safety Liaison, Office of Maintenance Safety, Equipment and Training.

7.02 Overview

Caltrans has the authority to close any State highway to protect the public or to protect the highway from damage. The highway may also be closed during construction, maintenance operations and potential emergencies.

The California Highway Patrol (CHP) is authorized to direct traffic, which includes stopping or expediting traffic for any purpose that will ensure safety. Stopping traffic could be the result of road failures, severe traffic conditions resulting from accidents, severe weather conditions resulting from heavy snow or rainfall, or any other

phenomenon that would endanger the public or to protect the highway from damage.

7.03 Relation of Chapter 7 to California Manual on Uniform Traffic Control Devices (CA MUTCD)

Since 2004, Caltrans has adopted the California Manual on Uniform Traffic Control Devices (CA MUTCD). Part 6 "Temporary Traffic Control" of the CA MUTCD establishes guidelines for traffic controls in highway construction and maintenance work zones. The MUTCD is published by the FHWA (Federal Highway Administration), while the CA MUTCD is published by the Division of Traffic Operations. In case of any inconsistency between the CA MUTCD and Chapter 7 of Maintenance Manual, Volume One, Maintenance forces are to follow Chapter 7.

Refer to the Division of Traffic Operation homepage for the Office of Signs, Markings and Permits for the most current version of the CA MUTCD.

7.04 Cooperation with the California Highway Patrol

CHP and Caltrans have a Joint Operations Policy Statement that functions as a guide for joint activities on State highways.

7.05 Highway Closure Notification

7.05.01 Streets and Highway Code (SHC)

SHC §124. The department may restrict the use of, or close, any State highway whenever the department considers such closing or restriction of use necessary:

(a) For the protection of the public
(b) For the protection of such highway from damage during storms or during construction, improvement or maintenance operations thereon

SHC §125. To notify the public that a state highway is closed or its use restricted, the department may:

(a) Erect suitable barriers or obstructions upon such highway.
(b) Post warnings and notices of the condition of any such highway.
(c) Post signs for the direction of traffic upon it, or to or upon any other highway or detour open to public travel.
(d) Place warning devices on such highway.
(e) Assign a flagger to warn, detour, or direct traffic on such highway.

SHC §127. The CHP shall cooperate with the department in the enforcement of the closing, or restriction of use, of any State highway.

7.05.02 Vehicle Code (VC)

"The Department of Transportation, or its duly authorized representatives with the approval of the department, while engaged in

the construction of a state highway upon new alignment, may restrict the use of and regulate the movement of traffic upon any highway intersecting the project at or near the place of intersection whenever such work interferes with or endangers the safe movement of traffic through the work." (VC 21370)

7.06 Notification of Highway Closure, Lane Closure, Controlled Traffic, Traction Control Devices (formerly known as Chain Control) or Incident of Significant Media Attention

The District Office Dispatch Center or Traffic Management Center (TMC) should be advised immediately by telephone or radio, whenever there is a highway closure, emergency lane closures, controlled traffic, traction control devices, or any incident of significant media attention. A highway is considered closed when all lanes of a divided highway, in any direction, are not passable, or when both lanes of an undivided two-lane highway are not passable. Highways are considered closed, even if traffic is moving on the shoulder or via a detour. The closure may be due to snow, slides, slip outs, floods, accidents or other causes. This information should be routed through channels, e.g., Maintenance Supervisor to Superintendent, to Region Manager, to Deputy District Director, Maintenance, and designated District Duty Officer. Levels of authority can be by-passed when not immediately available. The District Dispatch Office or TMC in turn, shall immediately advise the Headquarters Highway Communications Center by telephone, TTY (text telephone), radio, e-mail or fax. The same procedure shall be followed in reporting the opening of the highway that has previously been reported closed. The District Office Dispatch Center or TMC should also notify the appropriate CHP office of the closure and opening of highways.

Each month, all highway closures and re-openings shall be recorded and archived in the district office for a period of at least seven years.

7.06.01 Executive Reporting Procedures

It shall be the responsibility of the designated District Duty Officer to be familiar with the latest Executive Reporting Guidelines. The Duty Officer or alternates are to report events, as noted in the guidelines, and other significant events they feel could have a major impact on Caltrans. Reports shall be directed to the Director, or to alternates listed on the weekly Duty Officer roster.

7.07 Bomb Threat

When a report is received that explosives or bombs have been placed on the highway system, and the situation indicates that either the traveling public or our employees are in jeopardy, immediate action is to be taken to reduce such exposure to a minimum.

The Joint Operational Policy Statement between Caltrans and the CHP specifies that "The decision to close a highway rests with the first member of either department to arrive on the scene."

Reopening of the highway will be with the concurrence of both departments. "Differences of opinion concerning closure or reopening will be resolved in favor of the greater protection for the public."

In order to ensure the most rapid response to such threats, authority to take immediate action in closing a portion of the highway system is to be delegated to the lowest practical level. In Caltrans, this level will usually be defined as the field supervisor level. After taking action, the field supervisor will provide highway closure notification. In addition,

each district will develop procedures insuring prompt notification to the CHP of any actual or suspected incident involving an explosive device on a State highway or highway related structure. These procedures include the notification of any change in status of the affected highway or highway structure.

Bomb searches on State highways are the responsibility of the CHP under the Joint Operational Policy Statement. Districts, at their own discretion, may enter into a training program with CHP for selected employees in critical areas to aid in such searches. Selected employees should be volunteers and should be chosen because of specialized knowledge specifically needed to protect a vital segment of the highway system. Only those employees who need to participate will be allowed near a reported bomb area.

7.08 Emergency Detouring of Traffic

Attention is directed to the CA MUTCD Chapter 6C.09 "Detours and Diversions." When a road has been closed and will remain closed for several hours or longer, and a detour route is available, such detours should be signed as soon as possible.

If the closure involves a road where non-motorized (bicycle/pedestrian) travel is permitted or a separate bicycle/pedestrian path, personnel responsible for designating the detour route should provide a detour which enables continuity for non-motorized modes.

When a road is closed and no detour is available, warning signs should be placed at the nearest towns or other convenient points to reduce unnecessary motorist travel and confusion. If conditions are recurring, the necessary signs, made up by Maintenance forces, shall be kept on hand.

Where the closure affects a route or routes in other districts, the TMC of the affected district(s) must be advised at once so that the necessary detour signs may be placed. Headquarters Office of Structures Maintenance and Investigations should also be informed if the closure is caused by failure of a bridge.

The district office will notify the CHP and the local radio and television stations when local traffic is affected; and also notify the major networks when a main route is closed.

7.09 Flooded Traveled Way

When the traveled way is flooded but passable, Maintenance forces should place W55 (CA) "FLOODED" signs and delineators to mark the edge of the traveled way. Warning lights should be used whenever traffic would encounter some unusual or unexpected condition. Traffic controls may be placed to slow down traffic if flooded condition presents a surprise element. Close the road as soon as it is evident the water will become too deep for safe travel.

7.10 Supply of Signs, Etc.

Each supervisor shall be equipped with sufficient signs, barricades and portable flashers to enable him/her to protect the public against emergencies which may arise in their particular territory. A routine check shall be made to assure the availability of signs, barricades and condition of possible detour routes.

7.11 Disabled, Abandoned and Wrecked Vehicles

The legal authority for Maintenance forces to move unattended vehicles along or from a highway is quite limited. Sections 22654 (c) and (d) of the CVC permit removal by State forces of any disabled or unattended vehicle to the nearest safe and legal parking location under the following conditions:

(a) The vehicle is obstructing traffic
(b) The vehicle is obstructing work being performed on the highway. This reason is applicable to legally parked vehicles only if signs announcing the parking prohibition have been posted for at least 24 hours.

For further information regarding disabled and abandoned vehicles refer to CVC Sections 22654 (c) and (d).

Where the vehicle is clearly junk, is of no value, and has been in its abandoned location for a week or more (and the CHP refuses to see to its removal), it will then be in order for Caltrans Maintenance forces to haul it to the nearest available location for junking.

When it is necessary to clear a highway following a wreck, any debris or wreckage which constitutes a hazard to traffic should be immediately removed from the traveled way by Maintenance forces. In cases where death or serious injury results to any person, the damaged vehicle or debris should be left untouched and traffic protected by flaggers or barriers, lights, etc., until CHP has had an opportunity to examine the wreck.

In the event a Maintenance employee is required to aid a motorist whose vehicle has become disabled, under no circumstances shall the employee

accept payment for such assistance. Gratuities shall not be accepted from tow truck operators or anyone else who may be called to assist at the scene of an accident. Such assistance should be made only when commercial operators or CHP officers are not available.

When the decision to assist a stranded motorist is made, the employee shall inform Dispatch/TMC and request CHP response prior to leaving their vehicle, and shall follow up with Dispatch/TMC upon returning to their vehicle. If the Dispatch Center/TMC is not staffed then the employee shall make contact with their supervisor or the CHP directly.

7.11.01 When Permit is Needed to Remove Property

It is permissible to issue emergency permits to move on weekends or holidays, or after the usual hauling hours:

- for wrecked or broken down commercial vehicles carrying livestock or perishable cargo
- for loaded butane tankers and other highly flammable or explosive cargo

7.12 Moving Injured Persons

Maintenance personnel should use careful judgment in deciding whether to remove an injured person from the traveled way. It is preferable that this be done by or under the direction of a CHP officer, or paramedics. Factors to be considered include:

(a) If immediate First Aid and/or CPR (Cardiopulmonary Resuscitation), safety is required (life threatening)
(b) Danger from traffic to the injured person or others
(c) Danger to traffic by obstructing the traveled way
(d) Estimated time of arrival of the CHP or an ambulance. If a CHP officer is not available, and it is not convenient to notify the sheriff's office, Maintenance personnel are authorized by Section 20016 of the VC to arrange for an ambulance or some other conveyance to move the injured person to a hospital, if the injured person does not object to such transportation.

7.13 Deceased Persons

Bodies of deceased persons are not to be moved by Caltrans employees unless the location of the bodies clearly causes a significant danger to traffic or personnel. If the CHP cannot be located, information should be sent to the sheriff or coroner, who will arrange for removal of the bodies.

7.14 Warning Traffic

When a slide, slip-out or other incident occurs which partially or wholly blocks the traveled way, appropriate signs should be placed at each side of the location, and on the right of approaching traffic 400 to 800 feet in

advance of the obstruction. That portion of the road which is obstructed shall be blocked off with barricades. At night, warning lights should be placed on both signs and barricades, and a sufficient number set out along the road to outline the obstruction. This same procedure should be followed for road repair work which is not completed in one day.

(a) On roads carrying heavy traffic, one or more flaggers should be assigned, depending on length of control and sight distance.
(b) The W3-4 "BE PREPARED TO STOP" sign should be placed in advance of all flagger stations. Refer to Standard Plans T9 and T13 for guidance.
(c) Where the numbers of vehicles to be controlled are such that one flagger cannot handle the control and contact the last vehicle in line, a second sign shall be placed, and a second flagger assigned.
(d) Signs should be well lighted or retro reflectorized for night work.
(e) When flaggers are required, they should be logically placed in relation to the equipment or operation so as to give adequate warning.
(f) At the flagging station **cones** should be placed in position on the shoulder or otherwise to indicate the control point.
(g) All signs, barricades, and other equipment should be maintained in good condition.

Both the district office and headquarters should be notified in advance when a traffic control is to be established for an extended period of time. When the control is discontinued, signs and barricades should be removed immediately, and the district office, as well as headquarters, notified of the discontinuance.

Note: Barricades should not be used to channelize traffic.

7.15 Flagging Traffic

Attention is directed to Standard Plan T-13 and Chapter 6E Flagger Control of the CA MUTCD. Flagging of traffic should be handled in a uniform manner,

Flaggers are responsible for public safety and for temporary traffic control (TTC). Because flaggers have frequent contact with traffic, they should demonstrate the following abilities:

- Receive and communicate specific instructions clearly, firmly, and courteously.
- Move and maneuver quickly to avoid danger from errant vehicles.
- Control signaling devices (such as paddles and flags) to provide clear and positive guidance to drivers approaching a TTC zone in frequently changing situations.
- Demonstrate proper flagging methodology and operations.
- Demonstrate the proper use of the STOP/SLOW paddle and hand signals before being assigned as a flagger.
- Understand the layout of the work zone and flagging station.
- Understand and apply safe traffic control practices, sometimes in stressful or emergency situations.
- Hear, see, and recognize dangerous traffic situations and warn workers in sufficient time to avoid injury.

Flaggers must wear ANSI/ISEA 107-2010 or equivalent revision Class 3 apparel with a background (outer) material color that is fluorescent orange-red. The retroreflective material must be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors and must be visible at a minimum distance of 1000 feet.

The retroreflective clothing, or the retroreflective material added to the clothing, must be designed to clearly identify the wearer as a person and must have a minimum of one horizontal stripe around the torso. High-visibility clothing must be kept clean and in good repair or replaced. If a vest is worn, it must be fastened closed. Flaggers must wear safety glasses and a white hardhat.

A flagger shall not engage in argument with a driver or a passenger. If a driver refuses to obey a flagger's instructions, a record is to be taken of the license number of the car and the time of day, and a report made to the CHP officer on duty (Maintenance Zone Enhanced Enforcement Program (MAZEEP)) or the flagger's supervisor.

Refer to Chapter 6E of the CA MUTCD in section entitled “Flagger Procedures” for proper signaling devices and procedures.

7.16 Flagging Operations

Any time two-way traffic must share the same lane because of work in the other lane; a flagging operation shall be set up. See Standard Plan T13. A flagging operation can also be used for temporary road closure not exceeding 20 minutes. See Chapter 6H “Typical Applications”, Typical Application 13 of the CA MUTCD.

Flaggers shall receive on-the-job training before going on duty and shall follow the flagging procedures described in Chapter 6C "Temporary Traffic Control Elements" and Chapter 6E "Flagger Control" of the CA MUTCD. Flaggers should receive training and instructions based on the CA MUTCD and work site conditions that also includes the following:

(1) Flagger equipment which must be used
(2) Layout of the work zone and flagging station
(3) Methods to signal traffic to stop, proceed, or slow down
(4) Methods of one-way traffic control
(5) Trainee demonstration of proper flagging technique and operations
(6) Emergency vehicles traveling through the work zone
(7) Handling emergency situations
(8) Methods of dealing with hostile drivers
(9) Flagging procedures when a single flagger is used (when applicable)*

* Do not use a single flagger unless approved by the supervisor.

The training needs to be documented. Documentation of the training shall be maintained as required by Injury Illness and Prevention Program of the General Industry Safety Order in the California Code of Regulations (Title 8, Division 1, Chapter 4, Subchapter 7, Section 3203).

Traffic should be controlled by a flagger at each end of a constricted or closed section of roadway. One of the flaggers should be designated as the coordinator. To provide coordination of the control of the traffic, the flaggers should be able to communicate with each other orally or electronically**.** Where the end of a one-lane section is not visible from the other end, the flaggers shall use 2-way radios or other positive means to maintain control of traffic.

Flaggers should be rotated and relieved periodically to maintain alertness.

Flaggers shall wear American National Standards Institute Class 3 high visibility apparel. Additionally, flaggers shall stand where they are most visible to approaching traffic and avoid areas of shade, shadows, etc., whenever possible. Flagger stations shall be located such that approaching road users will have sufficient distance to stop at an intended stopping point.

The flagger shall identify an escape route that can be used to avoid being struck by an errant vehicle. Flagger stations should be located such that an errant vehicle has additional space to stop without entering the work space. The minimum distance required between the flagger and the work area is shown on the Standard Plan T13 and Table 2 on Standard Plan T9.

When a one-lane, two-way TTC zone is short enough to allow a flagger to see from one end of the zone to the other, traffic may be controlled by a single flagger. This method must be approved by the supervisor. When a single flagger is used, the flagger should be stationed on the shoulder opposite the constriction or work space, or in a position where good visibility and traffic control can be maintained at all times. When good visibility and traffic control cannot be maintained by one flagger station, traffic should be controlled by a flagger at each end of the section.

The cones on the centerline shown in Standard Plan T13 may be eliminated at the supervisor's discretion if a pilot car is used or an approved deviation is in place (see Chapter 8.07, Changing Chapter Standards),

The pilot car shall have radio contact with personnel in the work area and the maximum speed of the pilot car through the traffic control zone shall be 25 miles per hour.

- The G20-4 "PILOT CAR FOLLOW ME" or R115 (CA) "PILOT CAR DO NOT PASS" sign must be prominently mounted on the rear of the vehicle.

Flaggers shall be used when the drivers vision is impaired because of smoke or dust in work zones. They shall also be used to protect trucks that must turn on the traveled way to load or dump. The flagging procedures in Chapter 6C "Temporary Traffic Control Elements" and Chapter 6E "Flagger Control" of the CA MUTCD shall be followed.

Except for unusual circumstances or emergencies, flaggers should not be used on freeways.

Automated flagger assisted devices may be used to control traffic on two lane roads. The operation must conform to section 6E.04, 05, 06 of the CA MUTCD.

Traffic signals may be used to control traffic on two lane roads. The operation must conform to Chapter 4D Traffic Control Signal Features of the CA MUTCD and Typical Applications 12 and 14 of the CA MUTCD Chapter 6H.

7.16.01 Handling Emergencies Within the Work Zone

Warning signal for Maintenance forces at the work area

Prior to going out on the job, Maintenance forces shall establish a warning signal for the work area Maintenance forces in case of an emergency.

Emergency vehicles

Supervisors shall ensure that all Maintenance forces are aware of the procedures to be used whenever emergency vehicles approach the flagger's station. Supervisors should also discuss emergency procedures with local law enforcement agencies, ambulance services, and fire departments. When certain types of work, such as blasting or extensive excavation makes the roadway impassable, advance arrangements should be made with the local police agency or CHP who has jurisdiction over the roadway.

When informed in advance of an approaching emergency vehicle, the flagger should clear an unimpeded path for the emergency vehicle by stopping traffic from all directions.

When no advance notice is given, first stop the emergency vehicle, and then stop all traffic including construction equipment to provide a clear path for the emergency vehicle to pass.

Violations of traffic control and hostile drivers

Flagger should warn the Maintenance forces that a driver has run the flagger station. Stop all vehicles entering the work area, but do not put

yourself in an unsafe situation. Plan your escape route before an emergency occurs.

When dealing with hostile drivers, be courteous and professional. Do not get involved in an argument with motorists, bicyclists or pedestrians.

If a motorist fails to follow your instruction and threatens the safety of the work area, or is hostile, note the vehicle license number and description of the vehicle and driver. Report the information to the CHP officer on duty (MAZEEP) or your supervisor for the purpose of filing a police report.

Collisions in traffic control zone

Flaggers must know how to handle collisions in traffic control zone and be prepared for emergency flagging operations.

In the event of a traffic collision, notify your supervisor and call for help.

If a collision happens in the line of waiting traffic, stay at your station and continue to control traffic until you receive instructions from your supervisor or CHP.

If a collision happens within the controlled area, hold approaching traffic and follow instructions from the supervisor, the leadworker, or from the CHP.

7.17 Time Control

When a control is necessary over a narrow section of highway for an extended period, the District Director may recommend a time control.

Interested agencies, radio, television and social media may be notified of the time the road is to be closed and opened to traffic. The control is handled by flaggers supplemented by signs and publicity as to conditions.

7.18 Barricades

Attention is directed to Chapter 6F of the CA MUTCD in section entitled “Type 1, 2, or 3 Barricades”

7.19 Signs

Advance warning signs shall be placed when a stationary operation is on the traveled way, or is on the shoulder on a multilane highway with a paved shoulder of 8 feet or more in width. Also, warning signs shall be placed well in advance of the work, when traffic slows, changes lanes, or moves from its normal course of travel because of the work. The standard signs shown in the CA MUTCD Part 6, “Temporary Traffic Control” and in Standard Plans T9 through T17 shall be used.

Portable signs should be placed on sign standards with two (2) or more orange flags. The sign standard shall be in an upright position with the bottom of the sign panel a minimum of 1 foot above the level of the travel way. A cone shall be placed next to each warning sign. If portable signs are displaced or overturned during the work, they shall be immediately uprighted or replaced. Portable signs shall be held in position with approved ballasting devices only.

Use your vehicle to protect yourself from traffic while setting and retrieving warning signs. A shadow vehicle shall be used as a protective vehicle during the installation and retrieval of traffic cones and signs in the taper and tangent sections of a lane closure.

All planned lane closures on freeways with a usable shoulder 8’ or less in width should utilize a CHP traffic break for the installation and removal of the advanced warning signs and merging taper. Usable shoulder area is defined as any longitudinal paved or unpaved surface adjacent to the traveled way with:

1. Enough weight-bearing capacity to support temporary traffic control devices, such as flashing arrow sign, PCMS, and Shadow vehicle.
2. Slope not greater than 6:1 (horizontal : vertical).

When work is temporarily stopped or finished and traffic is not affected, all signs shall be promptly removed, dropped down, or turned away from traffic. Using signs when they are not needed reduces their effectiveness. In addition, installing them when they are not needed increases worker exposure to traffic.

Extra warning signs may be used when appropriate. For example, if queues are expected to develop in lane closures with reversible control, extra W3-4 “BE PREPARED TO STOP” signs can be used.

Placing an advance warning sign, such as a W20-1 “ROAD WORK AHEAD” sign, on the rear of a vehicle in the actual work area does not provide adequate warning to traffic, and is not permitted. However, an advance warning sign may be used on an advance warning vehicle.

Signs, such as W8-7 “LOOSE GRAVEL”, W21-2 “FRESH OIL”, etc., may be placed on barricades. The barricades shall be ballasted either internally or by means of sandbags placed on the lower parts of the barricade frame or stays. The sandbags shall not be placed on top of the barricade or, over any retro reflectorized barricade rail facing traffic.

For individual sign policy and specifications see CA MUTCD Chapter 6F "Temporary Traffic Control Zone Devices". For sign locations and placements see Standard Plans T-9 to T-17, CA MUTCD Chapter 6C "Temporary Traffic Control Elements" and Chapter 6H "Typical Applications". For signs used during flagging operation see CA MUTCD Chapter 6E "Flagger Control".

7.19.01 Supplemental Signing

The following signs may be used within an area closed to traffic after traffic has been directed around the work:

The W8-4 "SOFT SHOULDER" signs may be used on sections where the constructed or natural stability of the shoulder has been destroyed or impaired by maintenance or construction operations, such as in grading or spreading new material over the old. Retro reflectorized signs should be used on main traveled routes with unstable shoulders. Where the length of the soft shoulders is extensive; retro reflectorized signs should be placed at about one (1) mile intervals.

The R11-2 "ROAD CLOSED" is to be placed on a barricade at the point of road closure.

7.19.02 Rough Road

W8-8 "ROUGH ROAD" sign should be placed in advance of rough pavements as required. The road condition should be corrected as soon as possible.

W8-8

7.19.03 Emergency Signage Used When Restricting Loads on Bridges

Temporary Signs. When an emergency develops due to an accident or failure of a structure member, or when, after an investigation, it appears a structure is not capable of carrying full legal loads, temporary signs shall be placed immediately. The temporary signs are to notify traffic of the load limit, pending repair of the bridge or holding of a hearing and obtaining permanent signs. Districts should obtain a small supply of temporary signs, with blank space for filling in the weight or speed restrictions, so that they will be immediately available when required. Temporary signs may be secured from the warehouse, contract, or local vendor. A Portable Changeable Message Sign (PCMS) may also be used.

Permanent Signs. The R12-5 Weight Limit and R21 (CA) Bridge Speed signs, with limits as recommended by the Bridge Engineer, shall be erected to replace such temporary signs if the bridge cannot be repaired or strengthened within a reasonable time. Ordering of such signs need not wait upon the formal posting order. These signs shall be placed not more than 500 feet from each end of the bridge or structure.

R12-5

R21 (CA)

Where a detour is not available at the site of a posted bridge and trucks would have no opportunity to turn around and retrace their path, advance signs shall be erected to notify truck drivers of the restriction, thus affording them the opportunity of selecting another route. The following is a suggested wording for such advance signs:

LOAD LIMIT
10 TONS
ON BRIDGE
5 MILES
AHEAD

7.20 Traffic Controls in Snow Areas

Maintenance forces shall be prepared to handle traffic during snow and ice conditions.

7.20.01 Speed Regulations

Attention is directed to Chapter 2B of the CA MUTCD in section entitled "Speed Limit Sign (R2-1)." Section 22363 of the CVC authorizes Caltrans to erect appropriate speed limit signs for prima facie speeds of 40 miles, 35 miles, 30 miles or 25 miles per hour when, by reason of snow or ice conditions, such speeds are most reasonable or safe. The R2-1 speed limit sign should be used when required. Such speed limit signs may be placed and removed as snow and ice conditions vary. The only sign to be used to regulate speed in the snow areas is the R2-1 speed limit sign. It has been the practice to install R2-1 speed limit signs in the vicinity of resorts, ski tows, and at other critical locations where skiers and children frequently cross the highway. These speed limits should be established by District Traffic Operations.

7.20.02 Parking Regulations

Attention is directed to Chapter 2B of the CA MUTCD in section entitled "Parking, Standing, and Stopping Signs (R7 and R8 Series)." Section 22510 of the CVC authorizes Caltrans to prohibit parking on either or both sides of a highway which has been cleared of snow, but where the width of the highway is still restricted. The R26 (CA) and R28 (CA) "NO PARKING ANY TIME" signs are used to indicate the areas where parking is prohibited. Within those areas where parking is permitted, it is customary to install R25 (CA) "PARK OFF PAVEMENT" signs at frequent intervals.

7.20.03 Traction Control Devices

Attention is directed to Chapter 2B of the CA MUTCD. Most districts have certain areas that are subject to annual snowfall. It is good practice to install the SW58 (CA) "WATCH FOR SNOW REMOVAL

EQUIPMENT" signs in black letters on yellow, on all highways leading to snow areas. These signs are generally placed at the lower elevations where the first snow is usually encountered. They should either be hooded or removed during the summer season.

Traction control device areas are marked with R75 (CA) "CHAINS REQUIRED 1 MILE AHEAD" signs, R76 (CA) "CHAINS REQUIRED", and R78 (CA) "END CHAIN CONTROL". Within the traction control device area, Caltrans may permit, as an alternate, the use of snow tread tires on authorized vehicles. Standard chain signs should be in place on each side of built up areas that develop an appreciable volume of traffic. Permanent installations should be made to facilitate putting the chain signs into service by Maintenance personnel.

Permits to individuals, who must apply in person, for installing tire chains on highway right of way may be issued. Contact District Encroachment Permit Engineer for assistance.

Certain highways are allowed to close each winter due to heavy snow. At the beginning of these areas, signs reading "SNOW NOT REMOVED BEYOND THIS POINT--PROCEED AT YOUR OWN RISK" should be installed. Arrangements shall also be made to place signs prominently at important intersections and other advance points to inform traffic when a through route is closed by snow. Such a sign should read "_____CLOSED BY SNOW BEYOND_____."

7.21 Shoulder Closures

Working on the shoulder of a highway requires caution and awareness. Employees have been killed or seriously injured being struck by errant vehicles leaving the traveled way. It is every employee's responsibility

to be aware and watchful while performing work on the shoulder of any highway.

While working on the shoulder, keep a vehicle or other means of physical protection between yourself and approaching motorists. Keep to an absolute minimum the time you stand or work at the rear of your vehicle.

Shoulder closures are used to guide motorists around stationary operations on shoulders. A shoulder closure is optional on unpaved shoulders and two-lane roads. It must be kept in mind that shoulder closures provide no physical protection.

A shoulder closure is required for a stationary operation on a multilane highway with a paved shoulder of 8 feet or more in width whenever vehicles or equipment are parked on the shoulder for more than 20 minutes. Shoulder closures are to be set up as described on Standard Plans T10 and Part 6 “Temporary Traffic Control” of the CA MUTCD

For short duration shoulder operations of 20 minutes or less, signs/channeling devices may be eliminated if a vehicle with activated flashing amber light is used.

Shoulders used as part time lanes should be closed in the same way as lanes are closed.

A properly placed barrier vehicle shall be used with shoulder closures to protect Maintenance forces.

For traffic control procedures and layouts see Standard Plans T-10 for "Traffic Control System for Lane Closure on Freeways and Expressways and CA MUTCD Chapter 6H "Typical Applications" for conventional highways. For shoulder closure policies see CA MUTCD Chapter 6C "Temporary Traffic Control Elements" and Chapter 6G "Type of Temporary Traffic Control Zone Activities". For signs used during shoulder closures see CA MUTCD Chapter 6F "Temporary Traffic Control Zone Devices".

7.22 Moving Lane Operations/Closures

Before employees work in a moving lane closure, a pre-job meeting shall be held and documented on a "Safety Meeting Report" (Form PM-S-0110) and/or "BMP Tailgate Meeting Report" (Form NPDES-001) so that all involved employees will know what their role in the operation is and how to proceed safely.

In any slow moving operation, the first vehicle in the lane approached by motorists shall be a shadow vehicle.

For information on vehicle spacing, vehicle positioning, and signing, refer to Standard Plans T15 and T16, "Traffic Control System for Moving Lane Closure on Multilane Highways" and Standard Plan T17 "Traffic Control System for Moving Lane Closure on Two Lane Highways".

All vehicles used as shadow trucks shall be equipped as defined in Section 8.11, Protective Vehicles. Radio communication in all vehicles is required.

Other requirements for moving lane closures and shadowing moving operations, found in the Maintenance Code of Safe Operating Practices (CSOP), shall be followed.

Exceptions to this rule are tow trucks and snow removal/de-icing equipment.

During moving lane operations/closures on-foot exposure within travel lanes are prohibited except activities described in Section 7.25 Standard Exceptions to Lane Closure Procedures.

Standard Plans T15-T17 shall be followed when conducting moving lane operations/closures. Additional policies can be found in CA MUTCD Chapter 6G "Type of Temporary Traffic Control Zone Activities".

7.23 Lane Closures

A lane closure shall be set if a stationary operation takes more than 2 feet or reduces the width to less than 10 feet of an existing lane on a multilane highway. To take up to 2 feet of a lane on a multilane highway without a lane closure, a cone taper shall be installed that begins at least 300 feet upstream from the work area. Refer to Table 1 on Standard Plan T9 for taper length and cone spacing.

The lane of a two-lane highway shall be closed if work reduces the width of a lane to less than 10 feet. Traffic shall not be moved across the center stripe without a lane closure or other means of traffic control. In general, a flagging operation is used for such conditions.

A space of 6 feet should be maintained, whenever possible, between moving traffic and the work area. When closing a lane, a barrier vehicle or a shadow vehicle shall be used for the installation of the signs and the

flashing arrow sign (FAS) if they can be placed while off the traveled way on the shoulder or median. A shadow vehicle shall be used as the protective vehicle during the installation and retrieval of traffic cones and signs in the taper and tangent sections of the lane closure. All devices placed in areas with no shoulders from an open lane require the use of a shadow vehicle for protection.

Lane closures should be placed according to the Standard Plan T10, Traffic Control System for Lane Closure on Freeways and Expressways or the Standard Plan T11, Traffic Control System for Lane Closure on Multilane Conventional Highways. In case of any inconsistency between the Standard Plans and Chapter 8 of Maintenance Manual, Volume One, Maintenance forces are to follow Chapter 8.

7.23.01 Placement of Traffic Control Systems at the Start of Work

Ensure there is a traffic control system in place before commencing work. The following are some installation instructions depending on the situation in which the system will be used:

(1) Systems affecting traffic only in one direction—Start with the first device that the drivers will see as they enter the work zone (usually a W20-1 “Road Work Ahead” sign). Additional devices are placed in sequence, moving in the direction of the traffic flow. Move the Maintenance forces and equipment onto the closed lanes only after all system components are in place.

(2) Systems affecting traffic in both directions—Install the first sign drivers will see traveling in the opposing direction. Then install in sequence all remaining signs and devices in the opposing direction of travel. Next install the

first sign drivers will see in approaching the work area from the affected direction. Place all remaining signs and devices in sequence through the work area. If flaggers are to be used, have flaggers take their stations; then move Maintenance forces and equipment onto the road.

7.23.02 Removal of Traffic Control System at the End of Work

Ensure the traffic control system is removed following the reverse order of the placement sequence:

(1) Remove all Maintenance forces and equipment from the roadway.

(2) Then remove the devices and signs in the reverse order of placement. You may allow the forward mode of cone and sign retrieval for the merging taper and for ramps and connector closures when the shoulder area is not wide enough and restricts backing up the impact attenuator vehicle and cone truck. When the forward mode of retrieval is used, follow the Traffic Control Plans for a moving operation.

(3) Restore all signs and signals to normal operation.

If a lane closure begins to cause traffic to back up (commonly called queuing), the advance warning signs shall be moved back in advance of queuing, or additional advance warning signs shall be placed ahead of queuing, or PCMS shall be placed and maintained in advance of the upstream end of queuing. If the signs cannot be moved back, or additional signs cannot be placed, or the use of a PCMS cannot be

employed, the lane closure should be removed. If the lane closure results in a significant traffic delay, the closure may need to be removed.

A PCMS may also be used to redirect traffic and relieve queuing. The additional PCMS may be used at key interchanges and exit ramps and other locations where traffic queues may be expected due to maintenance activities.

A fixed Changeable Message Sign (CMS) may also be used to redirect traffic and relieve queuing.

If for some reason, a lane cannot be closed utilizing the requirements of this section, a deviation may be warranted. See Section 8.07, Changing Chapter Standards.

All lane closures shall follow the layout in Standard Plan T9-T17. Elements of a lane closure are described in CA MUTCD Chapter 6C "Temporary Traffic Control Elements". Signs and channelizing devices (i.e. traffic cones) used for lane closures are described in CA MUTCD Chapter 6F "Temporary Traffic Control Zone Devices". Additional lane closure layout can be found in CA MUTCD Chapter 6H "Typical Applications".

7.24 Closing Auxiliary Lanes

Work occurring at the beginning of an auxiliary lane such as a truck lane or lane added to increase capacity, will require as a minimum, the shoulder closure plan shown on Standard Plan T10 plus these additional requirements:

- A W20-1 “ROAD WORK AHEAD” sign instead of the W21-5 “SHOULDER WORK” sign on the shoulder upstream from the beginning of the auxiliary lane.

- A C20(CA) “R/L LANE CLOSED AHEAD” sign instead of the W21-5 “R/L SHOULDER CLOSED AHEAD”.

- A C20(CA) “R/L LANE CLOSED AHEAD” instead of the C30A(CA) “SHOULDER CLOSED”.

- Extend the cones from the shoulder to the beginning of the stripe for the added auxiliary lane. Continue the cones through the work zone.

- A C30 (CA) “LANE CLOSED” sign in the closed lane about 100 feet from its beginning and every 1,000 feet after that.

- Field staff should consult with the District Traffic Manager for additional recommendations associated with unique sight conditions that may require additional signs or delineation.

If the work site is a considerable distance from the beginning of the auxiliary lane and the above method is not practical, the lane shall be closed according to the Standard Plan T10A. If the auxiliary lane is located at an exit ramp or connector, the closure plan in Standard Plan T14 shall be used.

More layouts for auxiliary lane closure can be found in CA MUTCD Chapter 6H “Typical Applications”.

7.25 Standard Exceptions to Lane Closure Procedures

Short-duration operations may be conducted on the traveled way without using a lane closure or signs. Pothole patching and debris retrieval, are examples of brief operations. Prior to using this method a CHP traffic break should be considered. In order to conduct short term operations on the traveled way without using a lane closure or signs, all of the following conditions must exist:

1. The traffic volume must be light. This means the worker can walk from the shoulder to the site on the traveled way, do the job, and walk back to the shoulder without interfering with traffic.

2. Sight distance shall be at least 500 feet in each direction. Where 500 feet of sight distance is not available at the work site, one or more lookouts should be posted to extend visual coverage if necessary.

3. Vehicles must be parked completely off the traveled way.

If all three (3) of these conditions exist, the supervisor may instruct Maintenance forces to perform the work on a specified section of highway without a lane closure. All of the following work methods shall be used:

- When the Maintenance forces consists of at least two workers, one of the workers shall act as a lookout. The lookouts exclusive duty will be to continually watch for approaching traffic and to warn the worker whenever a possible work zone intrusion is suspected.

- The lookout shall not carry a flag or paddle and shall do nothing to control or influence traffic. All Maintenance forces shall be off the traveled way when traffic passes.

- Only one production worker shall be on the traveled way, unless more are needed to reduce the exposure time.

- Maintenance forces shall face approaching traffic whenever possible.

- Maintenance forces shall have a planned escape route.

- A FAS in the caution mode or a flashing amber light shall be operating.

- W20-1 "ROAD WORK AHEAD" signs are not required, since passing traffic is not to be affected.

A supervisor may allow pavement marking and relamping operations on the traveled way without a lane closure. The conditions above shall be met, and the work methods listed above shall be followed. The posted speed limit must be less than 55 miles per hour and the work must take less than 20 minutes to complete. It is recommended that the supervisor also use devices such as signs, FAS, barrier/shadow vehicles, MAZEEP and lookouts to increase worker protection. If vehicles cannot be parked completely off of the traveled way, then a shadow vehicle shall be required.

Lane closures are not required in traction control device operations. However, on multilane highways, they may be used to create a cushion between Maintenance forces and fast vehicles leaving the snow area. In

addition, a supervisor may use lookouts and barrier vehicles to increase worker protection.

The supervisor may allow moving shoulder operations next to the traveled way without a lane or shoulder closure. Shoulder grading, mowing, sweeping and spraying operations are examples of moving shoulder operations. The work must leave at least 10 feet of the lane next to the shoulder open to traffic. A shadow vehicle and/or vehicle equipped with a FAS is recommended but not required. See CA MUTCD Chapter 6H, "Typical Application", "Short Duration or Mobile Operation on a Shoulder". On two-lane conventional highways, traffic shall not be moved across the center stripe without a lane closure or other means of traffic control. For more information, refer to the CA MUTCD, Section 6G.02 "Work Duration".

7.26 Flashing Amber Lights and Rotating Amber Lights

Amber lights shall be used to alert motorists to work activity near, but not on, the traveled way. Amber lights are not to be used while driving at prevailing speeds, when parked in an established lane closure, or when no danger to the employee or motorist exists. Amber lights, to be effective, must only be used when they are needed. Flashing Amber Light includes such devices as flashing lights, rotating beacons, or light/stick bars.

Flashing and/or rotating amber lights are to be used on motor graders, snow removal equipment, and other specialized equipment that are operated on the traveled way at lower than prevailing traffic speeds.

Flashing amber/rotating lights are to be used on pilot cars while leading traffic. A flashing amber light should not be used at the same time as a

FAS because the arrow becomes more difficult to read. If the vehicles are equipped with both, do not use at the same time.

During the hours of darkness, or during periods of inclement weather, amber lights should be used with discretion.

The use of flashing amber lights and rotating amber lights shall follow California Code of Regulations: Title 13 Motor Vehicles. Additional information can also be found in CA MUTCD Chapter 6F “Temporary Traffic Control Zone Devices”, Section titled “Lighting Devices”.

7.27 The Use of the Flashing Arrow Sign

A FAS shall be a sign with a matrix of elements capable of either flashing or sequential displays. This sign shall provide additional warning and directional information to assist in merging and controlling road users through or around a TTC zone. A portable CMS may be used to simulate a FAS display.

Two types of FAS are Type I and Type II. The Type I has a minimum size of 8 feet x 4 feet and is typically a trailer mounted FAS. The Type II has a minimum size of 6 feet x 3 feet and is typically a vehicle mounted FAS.

The terms "arrow board" and "flashing arrow sign" are synonymous. A FAS has the following three mode selections:

(1) A Flashing Arrow, Sequential Arrow, or Sequential Chevron mode;
(2) A flashing Double Arrow mode; and
(3) A flashing Caution or Alternating Diamond mode

FAS in the arrow or chevron mode shall be used only for stationary or moving lane closures on multi-lane roadways. FAS shall be used to indicate a lane closure where traffic is required to merge into the next lane. FAS shall not be used to indicate a shift in traffic such as shifting traffic from the most outside lane on to the shoulder.

For shoulder work, blocking the shoulder, for roadside work near the shoulder, or for temporarily closing one lane on a two-lane, two-way roadway, a FAS shall be used only in the caution mode to alert the motorist that work activity is near.

During hours of darkness, the FAS shall be dimmed to prevent blurring of the arrow image.

Additional information on FAS can be found in CA MUTCD Chapter 6F "Temporary Traffic Control Zone Devices", Section "Arrow Boards". A list of allowed operating modes for FAS can be found in CA MUTCD Chapter 6F, Figure 6F-6 "Advance Warning Arrow Board Display Specifications".

7.28 Placing the Flashing Arrow Sign

When FASs are used to close multiple lanes, a separate FAS shall be used for each closed lane. In multilane closures on freeways and expressways (Standard Plan T10), one Type I FAS must be used for each lane closed. If a Type I FAS is not available, a Type II FAS may be used in place of a Type I FAS in the second and succeeding closed lanes. Under this condition, the Type II FAS shall be in place as soon as the traffic lane is closed and shall not be removed until the closed lane is opened to traffic. The Type II FAS shall not be moved to perform lane closure installation or retrieval. Please refer to Figure 6F-6 in the CA MUTCD.

The FAS shall be located behind channelizing devices used to transition traffic from the closed lane. The FAS should be placed on the shoulder at the beginning of the taper as shown in Standard Plan T10. If there is no shoulder, the FAS should be placed as close to the beginning of the taper as possible. A minimum 1500 feet of sight distance shall be provided, where possible, for vehicles approaching the first FAS.

If the FAS cannot be located properly, consider placing the taper in a different location.

Any shadow vehicle working on the traveled way of a multilane highway outside of a lane closure must be run with a FAS in an arrow mode.

Work vehicles that are being shadowed shall not display a FAS in arrow mode. The FAS, if available, should usually display caution mode. Two partially superimposed FASs may not give a clear message.

7.29 The Use of Road Flares

No activities that have the potential of starting a fire should begin before Maintenance staff consult daily distribution of Caltrans Daily Fire Danger Ratings and localized weather reports to ensure that all parameters of this policy are followed.

7.29.01 Before Road Flare Use

For static operations, consider alternative products such as electronic flares.

For moving operations/closures, consider Maintenance Zone Enhanced Enforcement Program (MAZEEP), additional shadow vehicles or Portable Changeable Message Signs (PCMS) instead of flares.

Managers and Supervisors shall ensure employees are familiar with their Districts' Fire Risk Management Plan.

The Maintenance Superintendent and Supervisor shall ensure that each member of the Maintenance crew has received instruction on the proper inspection, deployment, and disposal of road flares before use on the job. Please refer to the latest Code of Safe Operation Practices (CSOP) "Use of Road Flares".

If using a Truck Mounted Fusee Igniter, ensure the Maintenance crew is familiar with the "Truck Mounted Fusee Igniter" CSOP.

Road flares should be inspected prior to their use.

Loose caps should be tightened.

Road flares that are wet, leaking, expired, missing any portion of the paperboard covering, cap or cap wings, or otherwise damaged should not be used.

Separate damaged road flares for immediate disposal.

Dispose of damaged road flares in hazardous waste storage for proper disposal of perchlorate-containing substances, in accordance with the Caltrans Memorandum, "Perchlorate Best Management Practices," (May 2006).

7.29.02 During Road Flare Use

Use the least amount of road flares as possible without compromising safety.

Consider the use of alternative, non-flammable signal aids in lieu of road flares where practicable and safety is not compromised. Crews are authorized and encouraged to request CHP assistance.

When road flares are used, Maintenance Supervisor shall ensure that the job site is patrolled and monitored to ensure that road flares remain on the pavement and are extinguished.

Partially-burned flares that are extinguished before they burn out completely as manufactured may contain perchlorate and should be safely removed from the job site where possible and disposed of in hazardous waste storage.

Where possible, Maintenance Supervisors, Superintendents, and/or Managers should monitor weather conditions by accessing local National Oceanic and Atmospheric Administration (NOAA) weather data.

7.29.03 In areas with combustible materials* adjacent to the roadway, except in emergencies:

- During extreme (red flag) Fire Weather Conditions, the use of road flares is prohibited. Planned activities that need road flares shall be canceled.

- During high (yellow flag) and very high (orange flag) Fire Weather Conditions, operations shall include a skid-mounted or similar self-

contained pump and tank unit. This unit shall be mounted on a vehicle and capable of carrying and pumping 200 gallons of water, per the "Fire Prevention Guidelines".

If road flare use is necessary for emergencies during these weather events, a vehicle equipped with fire-extinguishing equipment shall be used in order to monitor and address flares until they have been entirely extinguished.

Call 9-1-1 and radio the local Traffic Management Center (TMC) to inform dispatch and request emergency fire response when a fire incident occurs that cannot be immediately resolved with fire suppression equipment readily available to the crew.

*Combustible material includes trees, brush, grasses, and other vegetation in sufficient quantity to start and maintain a fire.

APPENDIX A

Standard Plans T9 Through T17

For your convenience, attached to this document are the most commonly used Standard Plans. For a complete list, please visit: https://dot.ca.gov/-/media/dot-media/programs/design/documents/locked-2022-std-plans-a11y.pdf

T 9 - Traffic Control System Tables for Lane and Ramp Closures

T10 - Traffic Control System For Lane Closure on Freeways and Expressways

T10A - Traffic Control System For Lane Closures on Freeways and Expressways

T11 - Traffic Control System For Lane Closure on Multilane Conventional Highways

T12 - Traffic Control System For Half Road Closure on Multilane Conventional Highways

T13 - Traffic Control System For Lane Closure on Two Lane Conventional Highways

T14 - Traffic Control System For Ramp Closures

T15 - Traffic Control System For Moving Lane Closure on Multilane Highways

T16 - Traffic Control System For Moving Lane Closure on Multilane Highways

T17 - Traffic Control System For Moving Lane Closure on Two Lane Highways

CHAPTER 8
Protection of Workers

TABLE OF CONTENTS

8.01 Introduction

8.01.01 Chapter Contents and Resources

This chapter contains information relevant to the protection of Maintenance forces. It is Caltrans policy to conduct its business in the safest possible manner consistent with applicable law, policy, or rule.

This chapter of the Caltrans Maintenance Manual is a part of the Caltrans written Injury and Illness Prevention Program (IIPP). It provides detailed instructions for managers, supervisors, and employees. It is designed to help employees in their efforts to work safely. All employees are expected to follow these minimum guidelines.

For additional information see the following references.

- Maintenance Code of Safe Operating Practices https://maintenance.onramp.dot.ca.gov/downloads/maintenance/files/maint_safety_equip_train/worker%20safety/CSOP%2010-18-2022.pdf
- Caltrans Safety Manual https://hs.onramp.dot.ca.gov/employee-safety-manual-online
- Maintenance Hazardous Waste Manual https://maintenance.onramp.dot.ca.gov/downloads/maintenance/files/emergency_mgmt/Hazardous Materials Unit/Generated_Waste_Manual_July_2018 edited.pdf
- Director's Policy DP-03, Safety and Health https://admin.onramp.dot.ca.gov/downloads/admin/directors_policies/dp_03.pdf
- Caltrans Memorandum, "Perchlorate Best Management Practices" (May 2006)

https://env.onramp.dot.ca.gov/downloads/env/managedfiles/h003.pdf

8.01.02 Definitions

ANSI – American National Standards Institute
ASTM – American Society for Testing and Materials
CA MUTCD – California Manual on Uniform Traffic Control Devices
Cal/OSHA – California Occupational Safety and Health Administration
CCR – California Code of Regulations
CHP – California Highway Patrol
CPR – Cardiopulmonary Resuscitation
CPUC – California Public Utilities Commission
CSOP – Code of Safe Operating Practices
FAS – Flashing Arrow Sign
FRA – Federal Railroad Administration
GISO – General Industry Safety Orders
IIPP – Injury and Illness Prevention Program
LED – Light Emitting Diode
LMS – Learning Management System
MAZEEP – Maintenance Zone Enhanced Enforcement Program
MESO – Maintenance Employee Safety Orientation
META – Maintenance Equipment Training Academy
mph – Miles Per Hour
PCMS – Portable Changeable Message Signs
PPE – Personal Protective Equipment
psi – Pounds per Square Inch
RWP – Roadway Worker Protection
SDS – Safety Data Sheet
SHS – State Highway System
TMA – Truck Mounted Attenuator
TMC – Traffic Management Center

Moving Operations	A moving operation is any work activity that moves along the traveled way or shoulder slower than the prevailing speed of traffic. Moving operations may also involve short and/or periodic stops. On-foot exposure (for example, to remove a large piece of debris in front of a sweeper) shall be held to a minimum and physical protection from traffic is required. Some examples are striping, sweeping, spraying, raised pavement marker replacement, etc. These activities are exceptions to Note 10 on Standard Plans T15-T17.
Short Duration Operation	In general it can be defined as any activity that can be performed in 20 minutes or less during light traffic volumes, without interfering with traffic or placing the employee in jeopardy. Short duration activities are those in which it takes longer to set up and remove the traffic control zone than to perform the work. Some examples are pothole patching, removing a large piece of debris, etc. A protective vehicle or lookout shall be used.
Stationary Operation	A stationary operation is any work activity that includes Maintenance forces on foot or equipment occupying any part of a paved shoulder or the traveled way at one location for more than 20 minutes.

8.01.03 References and Hyperlinks

Some of the references found in this chapter have hyperlinks that connect to Caltrans intranet pages which are not displayable to the general public. Until such time that the specific reference becomes available on the internet, the user will have to contact their district maintenance engineer or the appropriate Headquarters division to inquire about the availability of the reference.

8.01.04 Chapter Contact

This chapter of the Maintenance Manual is maintained by the Maintenance Safety Liaison, Office of Maintenance Safety, Equipment and Training.

8.02 Overview

The most important part of Caltrans' job is to protect Maintenance forces from traffic, while getting work done. This is done by:

1. Letting the motorists know what is going on and where to drive

    - For this we use signs, barricades, cones, flashing amber lights, portable changeable message signs (PCMS) and flashing arrow signs (FAS), and other traffic control devices.

2. Avoiding the errant driver

    - Face traffic, stay aware through your own eyes and ears or those of a lookout who will warn you. Plan your escape route.

3. Using protective equipment

   - Protective vehicles, headrests, seat belts/shoulder harnesses, and personal protective equipment (PPE) as described in the Caltrans Safety Manual, Chapter 12.

4. Planning the work to reduce employee exposure to traffic

8.03 Managers and Supervisors Responsibilities

The following paragraphs summarize the basic elements of the Caltrans Injury and Illness Prevention Program (IIPP) and define who is responsible for enforcing the safety and health policies and practices. For further information, refer to the Caltrans Safety and Health Manual.

1. Supervisors and managers are the responsible persons to implement, maintain, and enforce Caltrans safety rules and policies.

2. Supervisors, in cooperation with training personnel, shall ensure that all employees receive safety related training to include:

   - General training to cover hazards basic to all places of employment.

   - Specific training to cover hazards that are unique to each employee's job assignment.

3. Supervisors, in cooperation with training personnel, shall ensure that all employees receive safety related training to include Chapter 7&8 of the Maintenance Manual Training (Traffic Management and Protection of Workers) be given to all new Field Maintenance employees prior to them working within the Right of Way and every

four years thereafter. Training shall be recorded in the Learning Management System (LMS). LMS will remind Supervisors and Employees when they are due to take the class again. Training shall be provided by a certified trainer and may be in-person or virtual.

4. Supervisors shall ensure that each employee understands how to complete each assigned task safely.

5. Supervisors shall ensure that each employee follows safe and healthy work practices and procedures, and shall initiate corrective action for non-compliance.

6. Supervisors shall keep abreast of safety and health regulations affecting the operations they supervise.

7. Supervisors shall ensure that each employee is provided with the equipment necessary to complete assigned tasks safely.

Supervisors or managers who observe an employee that appears to be unable to perform his/her assigned duties and have a concern about the safety of the employee or others, are responsible to prohibit that employee from continuing to work. The employee should be prohibited from working until a determination of the reason for the employee's behavior is made, or until a medical evaluation of the employee's fitness can be completed.

Any supervisor or manager who fails to enforce safety and health policies, procedures, regulations, laws, or rules shall be disciplined in accordance with Departmental Policy.

Supervisors and managers shall ensure that employee safety and health issues are discussed and assessed with employees at least annually at the

time of issuing an Individual Development Plan/Performance and Appraisal Summary, and/or at the time supervisors discuss employee probationary reports.

Supervisors in office work settings should include discussions about health and safety matters at routinely scheduled staff meetings, but at a minimum, shall have meetings with their employees at least quarterly to discuss safety and health issues.

Supervisors in field locations shall have tailgate safety meetings at least every ten (10) working days to be in compliance with the requirements of the Construction Safety Orders, California Code of Regulations (CCR)1509 (e), or when starting new work activity to comply with Code of Safe Operating Practices (CSOP).

Supervisors shall also conduct pre-job/post-job meetings with employees whenever a new process, chemical, material, or procedure is introduced that contains a new or previously unrecognized hazard, or when a new or previously unrecognized hazard is identified.

Supervisors shall provide initial safety orientation to new employees including, but not limited to, the specific hazards of the job, required PPE, and the CSOP.

8.04 Individual Responsibilities

Employees shall do everything reasonably necessary to protect their own safety and health and that of others by complying with all safety and health policies, procedures, laws, rules, or regulations. Employees shall report all injuries, illnesses, or hazardous conditions to their supervisor immediately, or at least by the end of the work shift.

Employees are expected to report to work mentally and physically capable of performing all of their assigned duties without jeopardizing the safety and health of themselves, other employees, or the public. Employees shall be free from the effects of medication, controlled substances, alcohol, or the complications arising from illness or injury, which might impair their judgment and/or ability to perform their work.

Employees are responsible to notify their supervisor of any personal medical condition or prescribed medication use that might impair their ability to perform their assigned duties. Employees should also report to their supervisor any behavior by another employee that reasonably indicates that they are not fit for duty.

Failure or neglect of duty may be cause for discipline in accordance with the provisions described in California Government Code § 19572.

8.05 Responsible Person in Charge

It is practice and policy that whenever two (2) or more employees are assigned to work together, one of the employees shall be placed in charge.

This responsibility is usually assigned to the designated supervisor or leadworker based upon his/her civil service classification. However,

there may be occasions when these individuals are unavailable to direct the work for given periods of time, or where emergencies arise that require non-supervisory employees to direct the work of others.

Supervisors shall always designate an individual to be in charge during any work assignment or absence, and identify the steps to be taken in the event of an emergency.

The following California Occupational Safety and Health Administration (Cal/OSHA) definition (found in Title 8, §1504) will be used to determine the "responsible person in charge":

> "Competent Person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them."

8.06 Work Site Safety

Managers and supervisors are responsible to:

1. Routinely inspect all field and facility work areas under their jurisdiction to identify, document, and eliminate hazards that may contribute to injuries or illnesses. In order to accomplish this, Region Managers should do three (3) or more safety reviews per month, and Area Superintendents should do three (3) or more field or facility safety reviews per week. Supervisors should be conducting a job hazard assessment daily. This information shall be recorded on the Job Hazard Analysis form (MTCE-0105).

2. Ensure that employees are properly trained and equipped to do their job, and that they understand how to do it properly.

3. Investigate every injury or illness, close call, near miss and vehicle accident to: (For further information, refer to the Caltrans Safety Manual, Chapter 4).

   - Determine contributing circumstances

   - Develop information that leads to correcting unsafe conditions and unsafe acts

4. Establish and maintain codes of safe operating practices, or equivalent, which identify hazards specific to job assignments.

5. Enforce all rules, laws, procedures, regulations, and policies that will promote, protect, and preserve employee safety and health.

8.07 Changing Chapter Standards

Chapter 8 requirements are intended for the usual situations. Unusual circumstances may call for greater or lesser protective measures than are described. It is not possible, or even desirable, that a manual such as this contain detailed rules for every possible situation. It is up to the supervisor to exercise judgment in applying these measures. Supervisors should not, through the use of protective devices, create greater hazard to their crews by increasing the severity and/or duration of exposure. They should consider all factors, particularly the safety of their employees, when applying the requirements of this chapter.

Deviations from standard measures may be judged desirable by the supervisor for a variety of reasons such as sight distance, proximity of ramps or street intersection, restrictive width, short duration of job at one location, or minimal exposure because of volume, speed, and proximity of traffic. **Decisions to reduce standard measures shall have the written approval of someone responsible for the work at the Area Superintendent level or higher.** This written approval shall describe the deviation and list the reason(s) it is needed. It shall be kept on file in the region office for three (3) years. This written approval is not needed in situations which develop suddenly and unexpectedly and demand immediate action to prevent injury or harm to Maintenance forces or the traveling public. Operations should be brought up to standard as soon as resources become available. The supervisor may increase Maintenance force protection using standard devices without approval.

The standard lane closure plans, Standard Plan T9 through T17, are for normal work zones and conditions. In unusual situations, the Maintenance Engineer may request District Traffic Operations to authorize a deviation at a specific location, providing:

1. The specific location is identified by county, route, and postmile.

2. The deviation does not compromise the safety of Maintenance forces**.**

3. The deviation is not for general use throughout the district.

4. The deviation and rationale are documented in district files.

The intent is to allow deviation at specific locations without creating individual district wide standard plans. A deviation could be allowed for an indefinite time at a specific location, if the special conditions remain unchanged.

8.08 Personal Protective Equipment (PPE)

Employees shall wear proper high visibility safety apparel as described in the Caltrans Safety Manual, Chapter 12. In addition to standard warning garments, employees who need extra visibility should wear ANSI (American National Standards Institute) Class 3 high visibility safety apparel during the day and shall wear ANSI Class 3 high visibility safety apparel at night and when flagging.

The supervisor should select and provide the proper equipment and ensure Maintenance forces wear it.

Refer to Appendix C of the CSOP and Chapter 12 of the Caltrans Safety Manual for more information about PPE. Refer to Chapter 15 of the Caltrans Safety Manual for the requirements when using respiratory protection.

8.09 Emergency First Aid

All Maintenance forces shall be trained in Standard First Aid and CPR (Cardiopulmonary Resuscitation) during the first three (3) months of their assignment, and at least once every two (2) years thereafter. All Tree Maintenance Workers and related classifications, and all designated Electrical personnel shall be trained in CPR during the first month of their assignment, and then at least once a year thereafter. The training must be certified by the American Red Cross or other accredited organization.

An approved first aid kit shall be available at each work site. First aid kits and supplies shall be kept in sanitary and usable condition and inspected at least monthly. The Caltrans Safety Manual, Section 9.09 and 9.10, specifies size, location, and quantity of supplies for various categories of first aid kits.

For more information on first aid and emergency medical care see Chapter 9 of the Caltrans Safety Manual.

When the decision to assist a stranded motorist is made, the employee shall inform Dispatch/TMC (Traffic Management Center) and request California Highway Patrol (CHP) response prior to leaving their vehicle, and shall follow up with Dispatch/TMC upon returning to their vehicle. If the Dispatch Center/TMC is not staffed then the employee shall make contact with their supervisor or the CHP directly.

8.10 Medical Treatment

Supervisors are responsible to ensure that if an injured or ill employee needs medical attention he/she will be taken to the nearest approved medical clinic or hospital emergency room for treatment. Supervisors shall post the name and location of each approved medical service provider in a conspicuous place at each Caltrans work site. At a minimum, they shall be posted on designated bulletin boards in hallways or individual offices, and other appropriate locations, such as motor vehicles, to ensure every employee is aware of the locations.

If the injury is serious call 9-1-1.

A supervisor or designee shall always accompany the injured or ill employee to the medical facility.

As conditions warrant, the supervisor should talk with the attending physician to determine the extent of the injuries, the affected employee's recovery period, ability to return to work, and the employee's ability to perform the full range of duties upon release.

The supervisor must describe to the doctor what modified duty is available so that the employee can return to work as soon as possible.

Employees shall report any work-related injury to their supervisor immediately, or at least before the end of the work shift. They shall also report the injury to the supervisor before going to a doctor.

For more information on reporting personal injury accidents and illnesses see Chapter 10 of the Caltrans Safety Manual.

8.11 Protective Vehicles

There are three classes of protective vehicles: Shadow, Barrier, and Advance Warning.

8.11.01 Shadow Vehicle

The purpose of a shadow vehicle is to provide physical protection for crews and their vehicles. The mass of the shadow vehicle is the most important factor in providing protection. The heavier the shadow vehicle, the better the protection that is provided.

A shadow vehicle shall be used to protect the work vehicle in a moving lane closure or when setting or retrieving lane closures. A shadow vehicle shall:

(a) Have a truck mounted attenuator (TMA) which softens the blow to our driver, and usually reduces the impact to the motorist. It may not reduce the distance a vehicle will roll ahead when hit.
(b) Be equipped with Type II FAS or PCMS.
(c) Be equipped with head restraint or high back seats.
(d) Be equipped with seat belts that have lap and shoulder harnesses.
(e) Be equipped with a two-way radio.

Typically, the shadow vehicle is occupied by the driver only. However, if a passenger must occupy the vehicle while it is shadowing, the passenger seat shall also be equipped with head restraints or high back seats and a seat belt with lap and shoulder harness.

The shadow vehicle shall be positioned in front (upstream) from the work vehicle between approaching traffic and the vehicle it is protecting. It should be positioned where it will provide the best protection: not too close, nor too far back. It must be positioned a sufficient distance upstream of the Maintenance forces or equipment being protected to allow for appropriate vehicle roll-ahead, but not so far that errant vehicles will travel around the shadow vehicle and strike the Maintenance forces /equipment.

When making the decision as to how to position the shadow vehicle, you shall use your best judgment. Because every situation will be different, you should take into consideration the following factors:

- Volume and speed of traffic—
  With higher speeds comes the potential for increased roll ahead if struck
  Will traffic volume affect the level of protection needed

- Physical configuration of the roadway itself—
  Curves vs. straight sections
  Hills or dips that impair forward vision
  Super elevation of curves
  Width of improved/unimproved shoulders

- Sight distance—
  How much sight distance is available

- Weather and pavement conditions—
  Dry, wet, icy
  Rough pavement

Discuss the above factors with your work crew prior to going out on the road. Maintain two-way radio contact with the work vehicle so that movements are coordinated.

8.11.02 Barrier Vehicle

A barrier vehicle is an unoccupied vehicle or piece of equipment used to protect Maintenance forces from errant motorists. Any vehicle at a work site can be used as a barrier. However, Maintenance forces shall use the heaviest vehicle reasonably available. In certain instances, more than one (1) barrier vehicle may be needed. A barrier vehicle does not require a TMA. However, if a TMA is available, it should be used.

Any vehicle that is used should be parked upstream from the work site between approaching traffic and the Maintenance forces. It should be parked where it will provide the best protection; not too close to the Maintenance forces, not too far back. It shall be carefully positioned so that it will intercept errant vehicles, but will not roll ahead into the work area. Always park the barrier vehicle with the emergency brake set and lower any attachments to the ground.

A barrier vehicle without a TMA can be parked a number of ways. It can be parked at an angle or straight across the lane in a closure. If it is parked at an angle, the front of the vehicle should be pointed away from traffic. The wheels shall be turned away from the work zone and away from traffic if possible. This will avoid motorist panic and prevent secondary collisions if the barrier vehicle is hit and pushed ahead. A barrier vehicle with a TMA should normally be parked parallel with the direction of traffic.

8.11.03 Advance Warning Vehicle

An advance warning vehicle is driven or placed upstream from a work zone (refer to the Moving Lane Closure Plans T15, T16 or T17). It alerts the approaching motorists of work being performed on or near the travel way.

If the vehicle encroaches into the traveled way, it shall be equipped as a shadow vehicle and operated in accordance with the guidelines in Section 8.11.01. If it encroaches into a freeway lane, the vehicle shall display a FAS or PCMS in the arrow mode. If it encroaches into a two-way conventional highway, the FAS or PCMS shall be in the caution mode, or display a flashing or rotating amber light.

8.12 MAZEEP (Maintenance Zone Enhanced Enforcement Program)

Caltrans coordinates with CHP to utilize officers on site at highway maintenance work zones. MAZEEP is used to reduce the potential for traffic collisions, reduce traffic speeds to the posted speed limits, and to increase safety of the Maintenance forces and motorists.

8.12.01 Responsibilities

- **Maintenance Area Superintendent** - or his/her designee, should make an assessment of the need for MAZEEP on projects that require the closure of traffic lanes or shoulders with either cones or moving vehicles. The Superintendent may also identify specific Maintenance operations where the use of MAZEEP may be required.

- **Maintenance Supervisor** - is responsible to request MAZEEP services according to the interagency contract, and to provide clear and concise instruction/direction as to what duties the officer will perform and placement of CHP vehicle. These instructions will include Maintenance forces and motorist safety concerns, traffic control procedures, and any anticipated traffic delays. This direction will be given prior to entering the work zone or at the pre-job meeting.

  Working in conjunction with the CHP, supervisors should discuss a contingency plan to be placed in effect should traffic delays beyond reasonable limits occur.

  Supervisors are responsible for discussing, arranging, and/or providing communications with on-site officers. This may include hand-held radios, cellular phones, or the use of multi-agency scanners set to the appropriate frequencies.

  Supervisors will work cooperatively with on-site officers to mitigate traffic delays caused by maintenance operations. Decisions to abate or discontinue work for traffic considerations shall be made collaboratively. Considerations shall be given to the type of work being performed, length of time until probable completion, and potential/probable exposure to personnel and additional traffic delays caused by resetting the traffic control system and reopening the work zone.

  If the supervisor has made a timely request, and MAZEEP service is not available, the supervisor may use alternate methods to enable the work to proceed. Alternate methods may include additional advance warning signs/vehicles, changeable message signs, lookouts, and/or additional protective vehicles.

8.12.02 Utilizing MAZEEP

Shall be requested for:

- All planned daytime or nighttime temporary closures of ALL lanes in the same direction of travel (full freeway closures).
- Planned night closures of two (2) or more lanes on a freeway with three (3) or more lanes of travel in the same direction.
- Using a traffic break in lieu of a closure where traffic will be held for minutes instead of seconds.
- Posting the Notice to Vacate at encampments.
- Performing an initial sweep of an encampment prior to clean up.

Should be requested for:

- Any location/project that exposes workers on foot to moving traffic where escape routes are limited by median barriers, bridge rails, or similar structures and where additional physical protection is not deemed adequate.

May be requested for:

- Daytime closures of one (1) or more lanes on a full freeway or expressway
- Mobile work, e.g.; sweeping, striping, replacing pavement markers, etc.
- All other night work as deemed necessary by the supervisor.

8.12.03 Determining When to Use MAZEEP

Risk factors should be taken into consideration when determining when MAZEEP will be appropriate. Safety reviews conducted by the Superintendent and supervisor prior to the project (in the planning stages) may identify additional risks; if so, these risks must be considered in the decision-making process. Some of these additional risk factors may include:

- Night maintenance activities that do not create an obvious work zone, such as replacing raised pavement markers or night sweeping operations
- Maintenance activities that require a large number of vehicles or haul truck movements in and out of the work zone
- Anticipated traffic queues that cannot be avoided
- Working in locations where traffic has been flowing at high speed, free flow conditions for a significant period of time prior to the work zone (assistance may be required to reduce traffic speeds)
- Routes with high volumes of truck traffic and/or steep down grades

When making the determination to use MAZEEP, be aware that overuse when conditions do not warrant may lessen its effectiveness in the future.

8.13 Planning Work to Reduce Maintenance Force Exposure

Supervisors shall plan work to minimize the amount of time employees are exposed to moving traffic. This can be done by choosing proper work methods, combining operations, avoiding high traffic volume periods, and utilizing MAZEEP and/or other devices designed to increase motorists awareness of the work zone.

Work methods and procedures should be designed to keep the amount of time Maintenance forces are exposed to moving traffic to a minimum. For example, crews should be instructed to assemble in areas well away from the traveled way, convoy to the work site, and perform their work.

In addition, when employees reach the work site, the work method should be designed to minimize the amount of time Maintenance forces spend on foot near moving traffic. The first choice should be to use mobile power equipment to do the work. A Maintenance force in a piece of equipment is generally much safer than a Maintenance force on foot. The next choice of work methods would be to provide Maintenance forces on foot with physical protection. For example, a barrier vehicle, guardrail, or some other obstacle can be used to provide physical protection. Certain circumstances may require Maintenance forces to be on foot without physical protection. In this situation, the work method should be designed so that Maintenance forces can face traffic whenever possible and can work apart as individuals and not in groups. If none of the above methods are possible, it may be necessary to have lookouts or a lookout alarm device or both. See Working Near Moving Traffic - Lookouts, Section 8.14.04.

When a lane closure is planned, especially on freeways, managers and supervisors should contact all crews who could work within the closure. Not only will more work be completed, but also more protective vehicles may be available at the work site, providing Maintenance forces with increased protection. In addition to Maintenance operations, managers should coordinate with District Traffic Operations, Surveys, and other district units for work needs within the closed lane. This approach will reduce employee exposure to traffic and the number of lane closures required for routine maintenance.

When planning combined operations, managers and supervisors shall also plan the work so that each employee has enough space to work safely. Refer to Crowding of Maintenance Forces, Section 8.14.03.

Another opportunity to reduce Maintenance force exposure to moving traffic is to carefully plan work on the highway. When there are fewer vehicles on the traveled way, there are fewer vehicles with an opportunity to hit Maintenance forces. When there is dryer weather, there is less of a chance of vehicles losing traction. When visibility is not sufficient to render clearly discernible any person or vehicle on the highway at a distance of 1,000 feet due to fog, blowing dust or smoke, supervisors must consider rescheduling planned activities that expose Maintenance forces on foot. Managers and supervisors should consider reducing employee exposure by requiring an unconventional workweek or extended and/or multiple work shifts to take advantage of lower traffic volumes. Managers should also review maintenance projects for opportunities to improve Maintenance force safety with a complete facility closure.

Before short-term tasks are assigned, the supervisor will determine if the task has to be done immediately, or if it could wait. He/she shall decide if it could wait until formal traffic control will be set up, and the job performed as a part of a combined operation. An example would be the removal of litter from a median area. If the debris is not a safety hazard, could picking it up wait until a lane closure is set for another reason?

Supervisors shall plan all work operations to minimize the need for the backing of equipment and vehicles at the work site.

Supervisors should conduct a post-job meeting with the crew and discuss lessons learned, i.e., what went right, what went wrong, and how as a team we could improve our work practices in the future.

8.14 Working Near Moving Traffic

When working on or near the traveled way for any amount of time, Maintenance forces must be aware of the hazards from errant vehicles. While working on the shoulder, it is imperative that you keep a vehicle or other means of physical protection between yourself and approaching traffic. Keep to an absolute minimum the time you stand or work at the rear of your vehicle. Maintenance forces on foot shall face traffic whenever possible. Always be aware of potential protective barriers such as guardrails, trees, or other natural obstacles that could be used to shield Maintenance forces from errant vehicles. If physical protection is not available, a lookout may be necessary (Refer to Working Near Moving Traffic - Lookouts, Section 8.14.04.)

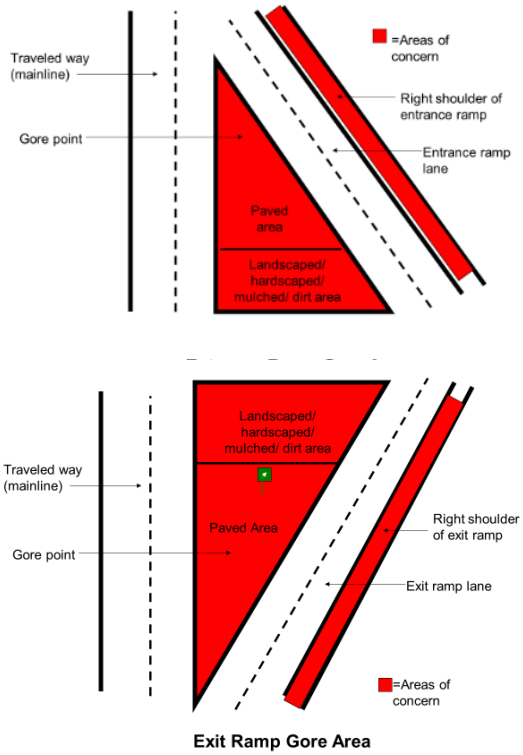
Working on the shoulder of a highway requires the utmost caution and awareness. Employees have been killed or seriously injured being struck by errant vehicles leaving the traveled way. It is every employee's responsibility to be aware and watchful while performing work on the shoulder of any highway.

Traffic on two lane conventional highways is often lighter than on freeways. Maintenance forces cannot let this fact lull them into a false sense of security.

When working on conventional two-lane roads, employees shall be aware that errant vehicles can enter the work area from either direction. Many two-lane operations involve short duration work such as fixing guide markers, straightening signs, and litter removal. These operations involve Maintenance forces on foot, often next to the traveled way. In these situations, employees shall make sure that they use their eyes and ears to look and listen for hazardous conditions to ensure their personal safety.

8.14.01 Gore Areas

While working or retrieving debris near or within a gore point, you shall be keenly aware of the dangers traffic poses while entering and exiting the highway. The gore areas are decision points where motorists are normally paying attention to the task of either exiting the highway or merging with traffic. Hazards exist primarily at two specific points; at the off ramp gore itself and on the right side of the on ramp gore point where motorists are usually looking over their shoulder or in the rear view mirror, not necessarily looking forward while preparing to merge with traffic.



Exit Ramp Gore Area

For stationary operations in gore areas, ramp closures and barrier vehicles should be placed to ensure Maintenance force safety in addition to required lane or shoulder closures on the through lane. On and off ramps should be closed per Standard Plan T14. Barrier vehicles shall be parked across closed ramp(s) to prevent traffic from going around the cones and signs. Special instances may require a deviation. If a deviation is required, please see Section 8.07 Changing Chapter Standards.

If you must work in a gore area for a short duration task, you shall use a barrier or shadow vehicle to protect yourself from oncoming traffic and have a lookout. For short duration tasks, it is recommended that you close the ramps or call for a CHP traffic break before performing the work.

8.14.02 Facing Traffic (Maintenance Forces on Foot)

Unless there is a clear reason for doing otherwise, employees shall continually face oncoming traffic while working on or near the traveled way. This is the personal responsibility of every Maintenance force.

Facing traffic is the most important thing you can do to protect yourself and your co-Maintenance forces while working on or near the traveled way. Facing traffic gives you a better opportunity to see and hear errant vehicles. This allows you a chance to move out of the way and warn fellow Maintenance forces. A lookout should be assigned when Maintenance forces are unable to face traffic. (Refer to Working Near Moving Traffic - Lookouts, Section 8.14.04.)

Maintenance forces shall plan escape routes when they arrive at the work zone and any time the job location changes within the work zone.

Consider the following when planning and establishing an escape route:

- A path you can use to get out of the way of errant vehicles
- The use of vehicles, equipment, terrain, vegetation and structures to shield you from errant vehicles
- All of the possible directions that vehicles can enter the work zone
- Worksite and activity hazards such as trenches and drop-offs within or near the work zone

Determining an escape route may take only a few minutes during the overall work zone planning process, but it can mean the difference between life and death.

8.14.03 Crowding of Maintenance Forces

Supervisors shall plan work so that each employee has adequate space to work safely.

Supervisors shall ensure that employees know their responsibilities for positioning themselves so that each employee has enough work space to work safely and avoid being struck by flying material or another Maintenance force's tools.

Maintenance forces shall avoid "bunching up", which increases traffic exposure and causes public concern.

8.14.04 Lookouts

While working on foot on or near the traveled way, employees should normally be protected by protective vehicles/equipment, guardrail, or other physical means. Where the absence of such physical protection exposes Maintenance forces on foot to errant vehicles, a person shall be assigned as a lookout according to circumstances described below.

1. A lookout shall be assigned if **all** of these conditions exist:

   - Work occurs on a roadway with a posted speed limit of 55-mph (Miles per Hour) or more
   - Maintenance forces are without physical protection
   - Two or more people working close to each other
   - Working within 30 feet of moving traffic

- A person is on foot

2. A lookout is required for short duration work if a protective vehicle or other physical barrier is not provided.

The lookout shall continuously watch approaching traffic for errant vehicles that may hit Maintenance forces on foot. If trouble is suspected, the lookout shall warn the Maintenance forces by yelling, using a vehicle or warning horn, a portable lookout alarm device, or any system capable of communicating the warning message. This warning is intended to give Maintenance forces the time to use a planned escape route to avoid the errant vehicle.

A lookout shall not be assigned any other duties and rotated often enough to keep them alert.

Electrical and mechanical detection systems may be used to supplement the human lookout.

In addition to lookouts, slope watchers shall be used when working under unstable slopes where rocks may fall and injure Maintenance forces. These slope watchers shall not be assigned to watch the slope and to lookout for traffic at the same time. Refer to the Maintenance CSOP, Slope and Embankment Maintenance, and Appendix E, Cut Slope Safety and the Caltrans Safety Manual, Chapter 21, Cut Slope Safety.

8.14.05 Parking

Before a vehicle is parked, the driver shall consider if the vehicle will be needed to perform the work. If not, the vehicle should be used for the physical protection of Maintenance forces. If it is used for protection, refer to Section 8.11, Protective Vehicles. If it will not be used for physical protection or for work, the vehicle shall be parked where it will not affect passing traffic or interfere with the maintenance operation.

All vehicles should be parked on the same side of the highway (see Section 8.18, Maintenance Crews Working Across From Each Other). Park beyond the paved shoulder if possible.

If a vehicle is parked on the shoulder on a multilane highway with a paved shoulder 8 feet or more in width for more than 20 minutes, then the shoulder shall be closed as shown in Standard Plan T10. This is not necessary on city streets where parking is expected.

8.15 Amber Lights

The use of flashing amber lights and rotating amber lights shall follow CCR Title 13 Motor Vehicles. Additional information can also be found in California Manual on Uniform Traffic Control Devices (CA MUTCD) Chapter 6F Temporary Traffic Control Zone Devices, Section Lighting Devices.

Amber light includes such devices as flashing amber lights, rotating beacons, or light/stick bars. Amber lights shall be used to alert motorists to work activity near, but not on, the traveled way. Amber lights are not to be used while driving at prevailing speeds, when parked in an established closure, or when no danger to the employee or motorist exists.

Amber lights, to be effective, shall only be used when they are needed.

Amber lights shall be used on motor graders, snow removal equipment, and other specialized equipment that are operated on the traveled way at lower than prevailing traffic speeds.

Amber lights are to be used on pilot cars while leading traffic. A flashing amber light should not be used at the same time as a FAS because the arrow becomes more difficult to read. If the vehicles are equipped with both, do not use at the same time.

During the hours of darkness, or during periods of inclement weather, amber lights should be used with discretion.

8.16 Working Equipment Against Traffic

Operating equipment against traffic is permitted when working on the shoulder or within a lane closure. This may be desirable in some cases, such as during crack sealing operations, where employees would have the added protection of the work vehicle between themselves and approaching traffic. Headlights shall be turned on during the daylight hours when working against traffic. They should be turned off at night when working against traffic, because they might confuse motorists.

8.17 Access to Median Work Zones

Maintenance forces should not walk across traffic lanes to work in median areas. They shall drive into the median area and park when possible. However, the width and condition of the median must be considered. If the area is too narrow, wet, sandy or is difficult to accelerate from, it should be avoided.

If it is not possible to park in the median area and crossing on foot is necessary, the following rules must be followed:

- Maintenance forces shall not run. They shall wait for a break in traffic adequate to allow them to ***walk*** across the lanes.

- Maintenance forces shall not carry tools or items that would slow them down and make the crossing unsafe.

- If the traffic is too heavy and a traffic break is not available, Maintenance forces shall wait for a safer time to do the job. If they must cross, they shall call for traffic control or ask for a CHP traffic break.

- If a vehicle is parked on the right side of the highway, then it should be positioned beyond the paved shoulder with amber lights turned off.

Additional information can be found in CA MUTCD Chapter 6G Types of Temporary Traffic Control Zone Activities, Work Within the Median.

8.18 Maintenance Crews Working Across From Each Other

Maintenance crews shall not perform work directly across from each other on the same direction of travel on the State highway system (SHS). This includes moving operations.

The intent of this guideline is to prevent the channeling of vehicles traveling in the same direction on SHS or causing vehicles to cross the centerline of a two-lane highway.

Crews shall not perform work directly across from each other on opposite sides of the SHS unless there is a median barrier or other divider. A distance of at least 2,000 feet must be kept between operations if work must be accomplished at the same time.

However, if flaggers, stop signs, or traffic signals positively control the traffic, the work sites can be closer.

8.19 Picking Up Litter and Debris

When retrieving debris from the traveled way, Maintenance forces shall wait for a break in traffic. A break in traffic is defined as all lanes clear of traffic long enough for the employee to ***walk*** out, retrieve the debris, and ***walk*** back to the shoulder (refer to Section 7.25 Standard Exceptions to Lane Closure Procedures). If no traffic breaks occur, contact the CHP to provide one.

Maintenance forces shall not try to flag traffic, use hand signals, or otherwise attempt to create a traffic break.

When debris is retrieved from the traveled way, Maintenance forces shall follow these guidelines:

- Maintenance forces shall remain in the vehicle until the traffic break approaches.

- An escape route shall be planned before leaving the vehicle. The vehicle shall not be parked where it will block the Maintenance forces' escape route.

- When Maintenance forces are on foot, their vehicle shall be kept between themselves and approaching traffic. Maintenance forces

shall ***walk*** beyond the outer edge of the shoulder, staying as far from moving traffic as possible.

- Maintenance forces shall always face approaching traffic.

The above procedures, except the traffic break, should be followed when removing debris from shoulders. However, a CHP traffic break should be considered when working in areas with limited or no escape routes.

Normally, the safest way to pick up litter is to work individually and always face approaching traffic. Trucks should be parked away from the work area unless needed to provide protection from traffic. The Maintenance forces may be dropped off and picked up later. The practice of employees walking beside a truck loading litter with a pitchfork or other hand tool should be avoided.

In the SHS where there are no median barriers, protective vehicles may be necessary at both ends of the work area as traffic could enter the median from either direction.

Litter bags should not be filled so full that they are too hard to lift. The bags should be placed where Maintenance forces can easily pick them up with minimum exposure to traffic. When possible, the bags should be stockpiled to reduce the number of stops needed for bag removal.

Do not place hypodermic needles in litter bags. *For more information, refer to the special instructions for the Handling and Disposing of Hypodermic Needles in the Maintenance CSOP.* Other sharp objects, heavy metal objects, tire treads, or concrete chunks should not be placed in litter bags. These items could seriously injure the person who picks them up.

8.20 Night Work

Extra caution is necessary at night when both motorist and Maintenance force visibility is reduced.

Each employee must be informed about the hazards of working at night as described in the IIPP. Careful planning is necessary, and all the potential problems that may be encountered while working on or near the traveled way should be considered. The use of MAZEEP will enhance the protection of Maintenance forces in lane closures.

During the hours of darkness, Maintenance forces on foot must wear the proper ANSI compliant high visibility safety apparel as described in the Caltrans Safety Manual, Chapter 12, which includes ANSI Class III warning garments.

The rain gear jacket shall be ANSI Class III compliant for nighttime wear. Reflective material may also be worn on hard hats.

Sufficient light should be provided at the work site. Light plants, floodlights, or work lights shall be mounted and directed in a manner to allow employees to work safely and to prevent glare to approaching traffic.

Because of the risk to Maintenance forces, nighttime call outs should be kept to a minimum. If there is no danger to the public, environment, or roadway, repairs should wait until the next day. For example, if the damaged facility does not encroach on paved shoulder areas or is more than 3 feet from the traveled way in unpaved shoulder areas, there should not be a nighttime call out except to place barricades. It is up to the supervisor to decide when it is appropriate to call out a crew for quick, temporary repairs, or to wait until daylight.

Call outs should be made when warning or regulatory signs have been knocked down and pose immediate danger to the motorist. Also, supervisors should consider responding at night for broken water lines, damaged phone or electrical lines, or spills where environmental damage may occur.

Each district will advise all local law enforcement agencies of this call out policy.

During hours of darkness, the lights on the FAS shall be dimmed to prevent blurring of the arrow image.

According to the California Vehicle Code, Section 280, "darkness" is any time from one-half hour after sunset to one-half hour before sunrise and any other time when visibility is not sufficient to render clearly discernible any person or vehicle on the highway at a distance of 1,000 feet.

Additional information can be found in CA MUTCD Chapter 6G Type of Temporary Traffic Control Zone Activities, Section Temporary Traffic Control During Nighttime Hours. Work site lighting information can be found in CA MUTCD Chapter 6F Temporary Traffic Control Zone Devices, Section Floodlights.

8.21 Transportation of Maintenance Forces

Maintenance forces shall be properly restrained by a safety belt which means that the lower (lap) portion of the belt crosses the hips or upper thighs of the occupant and the upper (shoulder) portion of the belt, **if present**, crosses the chest in front of the occupant.

Maintenance forces shall not be allowed to ride in the beds of dump trucks, buckets of loaders, on the sides or running boards of vehicles, on the loading sill of a trash compactor, or any other place on a vehicle or equipment that was not designed for driving or riding. The rear seats of a cone truck are designed for slow moving work zone operations only; they are not intended for general passenger use.

8.22 Operating Maintenance Equipment

Employees shall be properly licensed, trained, and qualified prior to operating equipment unsupervised. META (Maintenance Equipment Training Academy) guidelines for the Equipment Qualification Program are available in the Division of Maintenance web pages. District META coordinators may be contacted for assistance in locating the nearest qualifier or trainer.

8.23 Backing of Vehicles and Equipment

Backing accidents are the most prevalent type of vehicle accident. Because so many of the tasks Maintenance forces perform involve the backing of vehicles and equipment, the potential for serious accidents exists; therefore, extra emphasis shall be placed on preventing their occurrence.

Methods to avoid backing accidents should be discussed at regularly scheduled crew tailgate safety meetings. Any close calls and accidents that occur should be discussed, along with ways to prevent a recurrence.

8.23.01 Prior to Job/Planning the Work

- Supervisors shall plan work projects to minimize the need for backing of vehicles and equipment whenever possible.

- Design the work space to eliminate or decrease backing and blind spots; when feasible pull trucks into the work zone and let the operation catch up to them.

- At tailgate safety meetings, prior to the job, discuss how and when vehicles will be backing within the work zone and specific measures that will be taken to prevent an accident.

- Assign a spotter who ensures that employees on foot stay out of the work area and in clear view of those who are operating equipment.

8.23.02 Safety at the Worksite

- Maintenance forces on foot should be separate from equipment as much as possible to ensure that employees on foot stay out of the work area and in clear view of those who are operating equipment.

- Minimize the backing distance needed for heavy equipment to gain access to the work area.

- Employees should never move equipment without making positive visual contact with any Maintenance forces on foot around or near the equipment.

- In work zones where moving equipment has the potential to strike a Maintenance force on foot, employees shall not place themselves in or near the path of backing vehicles and should not enter the work area until it is clear for hand work. One person should be designated as a spotter while vehicles/equipment are moving within the work area.

- Every backing situation is new and different. Even if you work at the same location several times a day, you should be watchful for changes and any new obstacles.

- The driver and spotter should use hand signals instead of verbal ones and make sure they understand each other's signals. Don't have the spotter walking backwards while giving instructions.

- During shoulder or pavement rolling operations, make sure all Maintenance forces on foot are clear of the work area before moving any vehicles/equipment.

8.23.03 Personal Responsibilities

- Maintenance forces operating vehicles and equipment must be familiar with the blind spots for the particular equipment they are operating. Remember that mirrors can never give the whole picture while backing.

- Train Maintenance forces in appropriate communication methods (e.g., using hand signals and maintaining visual contact) to be used when Maintenance forces on foot are required to be in the same area as equipment.

- Do a walk-around of your vehicle before operating. Check for obstructions, low-hanging trees and wires, and any other potential clearance-related problems.

- On-foot personnel need to make sure they are a safe distance from vehicles in the work area. Do not stand where the operator cannot see you; a vehicle that has the potential to back up could run you over.

8.23.04 Working with Vendors/Contractors

- When working with outside entities, realize that their safety practices and procedures may be different than ours. This becomes especially important when vendor vehicles are backing within your work zone.

- Discuss backing procedures and practices with the affected personnel/vendors before the job begins, if possible. If not, use extra caution when vendor vehicles enter the work area.

- Make sure that vendor trucks and equipment operating in your work area have functioning back alarms. If they don't have a back alarm or it isn't working properly, tell your supervisor immediately and alert others working in the area.

- Designate a lookout to monitor vendor vehicle movements, especially if the task involves backing into an asphalt paver, backing from a staging position, or similar activity where employees are on foot in the work zone.

8.24 Working on Machinery and Equipment

Maintenance forces shall not work on electrical or mechanical equipment unless they are properly trained, and authorized by their supervisor to do so.

During repair, servicing or adjusting work, power driven machines equipped with lockable controls or readily adaptable to lockable controls shall be locked out or positively sealed in the "off " position. Those not equipped with lockable controls or readily adaptable to lockable controls

shall be de-energized or disconnected from its source of power. In all cases, accident prevention signs and/or tags shall be placed on the controls of the machines during repair work. No one shall remove the tag or unlock the switch except the person who placed it.

During repair, machines or equipment shall be effectively blocked or otherwise secured to prevent accidental movement if such movement can cause injury to employees. For example, before working underneath any vehicle and/or equipment to adjust or inspect it, steps shall be taken to ensure that the vehicle cannot move. Shut off the engine, set the brakes, and physically block the wheels with wheel chocks before any work begins.

Remove the keys from the vehicle and place a "Do Not Operate" tag in the ignition switch, on the steering wheel or some other very visible location. When working on a motor grader or other equipment that has implements such as blades, plows or buckets attached, you shall lower them to the ground or block and/or chain them up before working underneath them.

Never get under a vehicle or equipment supported only by a jack or held up only by the equipment's lifting system. An approved safety stand or other device designed to support the load shall be used. Do not use makeshift or homemade devices or unstable materials.

Employees shall not work under a raised dump bed or other raised vehicle bed, unless the safety stand is in place. Raise the bed, place the stand in its holder and lower the bed onto the stand before beginning the work.

Air and hydraulic hoses shall be depressurized before working on them. Maintenance forces shall not search for hydraulic leaks with their hands;

use a piece of wood or cardboard. Hydraulic fluid or air under pressure could enter your skin and cause serious injury.

Bleed pressure on spray tanks before opening or working on them. This includes chemical spray tanks, emulsion tanks on trucks or trailers, and even Hudson-type pump sprayers.

Before adjusting, cleaning, or repairing brush chippers, read the operators manual and take steps to ensure that all potential energized parts have been locked out. This includes the guillotine guards on those so equipped and all parts of the rotating drum.

Equipment or machinery shall not be operated without the required guards or shields in place.

During adjusting or cleaning operations, never reach into the operating equipment. Use an extension tool or other means of removal if necessary—not your hands.

This information is provided to help employees comply with the General Industry Safety Orders (GISO), Section 3314, The Control of Hazardous Energy for the Cleaning, Repairing, Servicing, Setting-Up, and Adjusting Operations of Prime Movers, Machinery and Equipment, Including Lockout/Tagout.

8.25 Tailgates of Trucks

Each year, employees are injured removing debris or rocks from dump truck tailgates. Do not use your hands or fingers to clear debris from the tailgates of dump trucks. Use a shovel, digging bar, or other tool to remove debris.

8.26 Compressed Air

When using compressed air, you shall always wear safety glasses.

Never use compressed air to transfer liquids from one tank to another unless tanks are designed for such service.

At no time shall compressed air be directed toward a person. When compressed air is used, all necessary precautions shall be taken to protect persons from injury. Do not use compressed air to "blow down" clothing or skin. Compressed air nozzles must be of the safety type that limits pressures to 10 psi (pounds per square inch) or less.

Tanks or drums not designed for use as compressed air tanks shall not be filled with compressed air.

Air hoses shall be checked regularly to ensure that they are in good condition. Cracked or leaking hoses shall be removed from service and replaced. Compressed air tanks should be checked and drained weekly or more often if conditions warrant.

Compressed air-tank operating permits should be conspicuously displayed and kept current. Air tanks shall be inspected as required by the Unfired Pressure Vessel Safety Orders, Title 8 CCR Section 461.

All compressed air equipment and plumbing shall meet the requirements of the Unfired Pressure Vessel Safety Orders.

Compressors that start automatically require a warning sign.

8.27 Work on Electrical Circuits

Only qualified and trained persons shall work on electrical equipment or systems. All work performed directly on or in proximity to electrical installations, equipment or systems operating or intended to operate at 600 volts or less shall comply with the Low Voltage Electrical Safety Orders. All work performed on systems operating at more than 600 volts shall comply with the High Voltage Electrical Safety Orders.

The Codes of Safe Operating Practices for work performed on electrical equipment or systems contain more information on the specific hazards and on the proper safety procedures to follow while performing the work. Never work on energized electrical systems unless you are properly equipped and trained to do so.

This section does not apply to installations of conductors and equipment in vehicles operating at less than 50 volts, or to their ignition systems.

8.27.01 Clothing and PPE for Caltrans Electricians and Other Caltrans Employees Working on Electrical Systems

The standard clothing for Caltrans electrical Maintenance forces shall be (shirts, pants, coveralls, etc.) flame retardant, and a minimum arc-flash rating of 8 cal/cm^2 (meeting ASTM "American Society for Testing and Materials" F1506 requirements and tested according to ASTM F1959). Shirts/coveralls shall be long sleeve, and be able to close at the neck. Short sleeve shirts are not allowed for electrical Maintenance forces. Leather work boots are required at all times.

Jackets, parkas, rain wear, and other outer garments shall also be flame retardant and rated for a minimum arc-flash rating of 4 cal/cm^2.

It is recommended that clothing and undergarments (worn under the arc-rated clothing layer) be constructed of fabrics that are either naturally flame resistant or treated to be flame resistant, with only enough synthetic fibers and/or elastic to provide support.

Care and cleaning of this clothing (standard and outer) shall be as recommended by the manufacturer, and not interfere or degrade the flame resistance or arc flash rating of the clothing. The employees shall inspect clothing after every washing and report deficiencies to the supervisor.

In addition to the standard Maintenance force protective clothing, Caltrans electrical Maintenance forces that routinely work on or near energized systems (of over 50 volts to ground) are required to have the following PPE on hand at all times:

- flame retardant reflective vest (meets ANSI Class 3 requirements for reflective clothing)
- insulated gloves w/leather protectors (compliant with ASTM D 120, and ASTM F 696), rated for 500 volts (minimum)
- clean leather work gloves
- arc-rated face shield (minimum arc-flash rating of 8 cal/cm^2)
- arc-rated hood sock (or balaclava) (minimum arc-flash rating of 8 cal/cm^2)
- insulated hand tools (compliant with ASTM F 1505)
- lockout-tagout device and personal lock (the employee and employee's supervisor or designated leadworker shall be the only ones to have keys to the lock at the worksite)

The employee must have this clothing and equipment available at all times when at work. Reporting to work without this clothing and equipment may be grounds for the supervisor to initiate corrective

action. Employees are responsible for notifying the supervisor of any damage or deficiency in the assigned PPE as soon as possible, and by the end of that day or shift.

PPE shall be inspected at every safety tailgate meeting. Documentation of inspection may be required. During the inspection, deficiencies shall be noted and replacement equipment shall be ordered and/or provided.

Additional PPE shall be provided on a need basis. High voltage equipment shall be in excess of the equipment listed above.

Additional Requirements:

Leather Gloves

The following requirements are for leather gloves used in electrical work for energized systems under 250 volts. The use of leather gloves and insulated tools exceed the California Electrical Safety Orders for energized systems 250 volts and under.

- Leather gloves shall be of all leather construction.
- Leather gloves shall extend at least two inches beyond the end of the sleeve.
- Leather gloves shall be clean and dry.
- Leather gloves that have been contaminated shall be replaced. Contaminated gloves may be used for other uses (not around energized electrical systems).

Insulated Tools

- Insulated tools shall be used on all energized systems.
- Insulated tools shall conform to ASTM F 1505.

- Insulated tool kit shall consist of a minimum of: (a minimum of eight tools).
  (a) lineman pliers
  (b) needle nose pliers
  (c) diagonal wire cutters
  (d) Philips #1 and #2 screw drivers
  (e) slotted 3/16 and ¼ screwdrivers
  (f) wire stripper

8.28 Working Near Utilities

8.28.01 Overhead Utilities

Maintenance forces shall not be required or permitted to perform any function in proximity to energized high voltage lines. Any activity where any parts of tools, machinery, or materials that an employee is touching or any part of an employee's body will come closer than the minimum clearances from energized overhead lines set forth in the following table is prohibited. Employees who work in proximity to or will come within the clearances of the table of any overhead lines shall be trained in the hazards and identification of types of overhead lines. If lines are low voltage (less than 600 volts) a minimum clearance of 3 feet shall be maintained at all times unless lines are de-energized and grounded. For Tree classifications trained in aerial rescue, refer to the Tree Safety and Aerial Rescue Manual. All overhead lines shall be considered energized unless de-energized and grounded at the site by the utility operating the line.

Boom equipment shall not be operated where the boom could come within the minimum required clearance set forth in this table. Hoisting over energized lines is prohibited.

Nominal Voltage (Phase to Phase)	Minimum Required Clearance (Feet)	Minimum Required Clearance (Meters)
600 50,000	10	3
Over 50,000 75,000	11	3.4
Over 75,000 ... 125,000	13	4
Over 125,000 …175,000	15	4.6
Over 175,000 … 250,000	17	5.2
Over 250,000 … 370,000	21	6.4
Over 370,000 … 550,000	27	8.2
Over 550,000…1,000,000	42	12.8

Figure 8-2: Overhead Utilities

If downed power lines are present, Maintenance forces shall not try to move or repair them. They shall stay clear and notify supervisor and/or Dispatch. Wait for the local utility company to respond.

8.28.02 Underground Utilities

Before any digging or excavations are begun, the area shall be checked to determine if there are any buried utilities. 4216 (g) "Excavation" means any operation in which earth, rock, or other material in the ground is moved, removed, or otherwise displaced by means of tools, equipment. Or explosives in any of the following ways: grading, trenching, digging, auguring, tunneling, scraping, cable or pipe plowing and driving, or any other way. Before disturbing the soil, determine whether and underground installations or utilities are likely to be encountered contact Underground Service Alert (USA) prior to work. The Superintendent or supervisor shall notify the appropriate USA Regional Notification Center for operators of subsurface installations at least two (2) working days, but not more than 14 calendar days, prior to commencing any excavation with power tools.

The Regional Notification Centers include but are not limited to the following:

NOTIFICATION CENTER	TELEPHONE
Underground Service Alert Northern California (USA)	1-800-642-2444
Underground Service Alert Southern California (USA)	1-800-422-4133

You may also call 811 from anywhere in the country to be connected to your local Notification Center.

Utility markers or buildings that have no above ground source of power can indicate underground utilities. If the excavation will be conducted in an area which is known, or reasonably should be known, to contain subsurface installations, only hand tools shall be used for digging.

Any person who damages underground services as a result of failure to notify USA is liable for both criminal and civil sanctions. Both individual employees as well as Caltrans can be held liable for negligent or knowing violation of the law. Caltrans will take disciplinary action, up to and including dismissal, on employees who willfully violate notification requirements.

Appendix A includes detailed information regarding USA and requirements for notifications.

If the excavation will be conducted in an area which is known, or reasonably should be known, to contain Caltrans electrical facilities, the Superintendent or supervisor shall notify the Electrical Supervisor for the area, prior to commencing any excavation.

IN ALL CASES, LOCATION OF UNDERGROUND UTILITIES, OR A CLEARANCE, SHALL TAKE PLACE BEFORE EXCAVATION OR DIGGING BEGINS.

8.29 Ladders

Ladders shall be maintained in good condition at all times. The joint between the steps and side rails shall be tight, all hardware and fittings securely attached, and the movable parts shall operate freely without binding or undue play.

Metal ladders shall not be used while working on electrical equipment. All metal ladders shall be marked with a sticker or stencil that clearly states: **"Caution–Do Not Use Around Electrical Equipment."**

Supervisors shall inspect ladders monthly for wear and damage. All ladders shall be cleaned of oil, grease, or slippery materials. Ladders which have developed defects shall be withdrawn from service for repair and tagged or marked as **"Dangerous, Do Not Use".** Defective ladders not being repaired shall be destroyed prior to being discarded.

When ascending or descending a ladder, the user shall face the ladder and maintain contact with the ladder at three-points at all times.

The employee shall climb or work with the body near the middle of the step or rung and shall not overreach from this position. When necessary to avoid overreaching, the employee shall descend and reposition the ladder. When it is not practical to work with the body near the middle of the step or rung, the ladder shall be secured to the top support, and the employee shall be protected by a personal fall protection system in accordance with Article 36 of the High-Voltage Electrical Safety Orders, Article 24 of the Construction Safety Orders, Article 12 of the GISO, or Article 1 of the Telecommunication Safety Orders. Operations or conditions not specifically covered by Article 36 of the High-Voltage Electrical Safety Orders, Article 12 of the GISO, or Article 1 of the Telecommunication Safety Orders shall comply with the fall protection provisions of Article 24 of the Construction Safety Orders.

GISO Section 3276 requires that all employees shall be trained in the safe use of ladders. Contact the District or HQ Safety Office for assistance.

8.30 Fall Protection

Approved personal fall arrest, personal fall restraint or positioning systems shall be worn by those employees whose work exposes them to falling in excess of 7 1/2 feet from the perimeter of a structure, unprotected sides and edges, leading edges, through shaft ways and openings, sloped roof surfaces steeper than 7:12, or other sloped surfaces steeper than 40 degrees. **All employees using aerial lift equipment shall use a personal fall protection system.**

§3276. Portable Ladders.

(e)(15)(A)

The employee shall climb or work with the body near the middle of the step or rung and shall not overreach from this position. When necessary to avoid overreaching, the employee shall descend and reposition the ladder. **When it is not practical to work with the body near the middle of the step or rung, the ladder shall be secured to the top support, and the employee shall be protected by a personal fall protection system** in accordance with Article 36 of the High-Voltage Electrical Safety Orders, Article 24 of the Construction Safety Orders, Article 12 of the General Industry Safety Orders, or Article 1 of the Telecommunication Safety Orders. Operations or conditions not specifically covered by Article 36 of the High-Voltage Electrical Safety Orders, Article 12 of the General Industry Safety Orders, or Article 1 of the Telecommunication Safety Orders shall comply with the fall protection provisions of Article 24 of the Construction Safety Orders.

Standard Guardrails

These are the preferred method of fall protection. They prevent the employee from falling.

1. Standard guardrails consist of a top rail and mid rail, must be between 42 to 45 inches high, and must protect the edge on all open sides.

2. Refer to 8CCR § 3209 for specific construction requirements.

Personal Fall Restraint System

A personal fall restraint system consists of:

1. A body belt (or body harness with side D-rings).

2. An anchorage point capable of supporting 4 times the intended load.

3. A 2-foot lanyard (for situations where a 2-foot lanyard is too short for the employee to reach their work, a longer lanyard may be used but must be rigged to prevent the employee from falling).

4. If the fall restraint cannot be rigged in such a way to prevent a fall, a personal fall arrest system is required.

Personal Fall Arrest System

A personal fall arrest system consists of:

1. A body harness with D-ring at the center of the back.

2. A decelerating/shock-absorbing lanyard rigged to limit a maximum free fall to 6 feet; or a self retracting lifeline.

3. Adequate clearance to ensure the employee cannot contact the ground, obstructions below, passing traffic, etc. in case of a fall.

   Note: A shock- absorbing lanyard will lengthen approx. 4 feet during a fall, for a total length of approx. 8 feet (if rigged to allow for only a 4-foot fall as required). If the employee is 6 feet tall, at least 14 feet of clearance is required.

4. An anchorage point designed to hold a minimum of 5000 pounds, 3000 pounds for a self retracting lifeline or, installed as part of a complete personal fall protection system designed under the supervision of a professional engineer with a safety factor of at least two.

   Note: Fall arrest systems cannot be utilized when working in aerial equipment unless that equipment is designed to support at least 5000 pounds or it can maintain a safety factor of at least two. Because most aerial equipment cannot support this load, personal fall restraint is the preferred fall protection system in aerial equipment.

Additional Fall Protection Requirements

1. Fall arrest system use requirements
   a. Make provisions for prompt rescue in case of a fall. At least one additional person on site, trained in use of fall arrest equipment, aerial lift, emergency lowering procedures, and the

emergency rescue plan shall be provided. If an outside agency (i.e. fire department) will provide rescue, advance contact to confirm availability is required.

b. Position equipment to allow adequate clearance. Park the vehicle so that it will not interfere with passing traffic.
c. If working over a traffic lane, the lane must be closed if you are using fall arrest.
d. Employees shall be secured from falls at all times.

2. Standard guardrails are not an acceptable anchorage point for personal fall restraint or fall arrest systems, unless designed for that purpose. **(Standard guardrails mounted on Caltrans sign structures are not designed for that purpose.)**

3. Knots tied in lanyards to shorten the length are not permitted.

4. Lanyards shall not be clipped together.

5. All personal fall protection equipment shall be inspected daily, before each use, and defective equipment shall not be used.

6. All personal fall protection equipment must meet ANSI standard A10.14-1991, or Z359.1-1992.

See the Safety Manual Chapter 12, section 12.16 for additional specific information, and requirements on equipment used when working in trees and on cut slopes.

8.31 Confined Spaces

Maintenance forces need to be aware of confined spaces and their hazards.

A confined space is any location where:

(a) an employee can physically enter, and

(b) has limited or restricted means of entry or exit, and

(c) is not designated for continuous employee occupancy.

For Caltrans employees, confined spaces include, but are not limited to locations such as tanks, sumps, drain inlets, bridge cells, shafts, pits, bins, tunnels, tubes, pipelines, trenches, vaults, vats, pump houses or compartments, sewage lift stations, culverts, or similar type locations. No person shall be allowed to enter a confined space unless they have completed Confined Space Training. Refer to Caltrans Confined Space Program (Chapter 14 of the Caltrans Safety Manual), and the Maintenance Confined Space Entry Procedures (Appendix B in the Maintenance CSOP). Additionally, no entry will be permitted unless the necessary air monitoring has been done.

All employees whose job description requires entry into a confined space on a routine basis shall be trained in Confined Space Training annually.

8.32 Trench and Excavation Safety

Employees shall review Appendix D, "Trench and Excavation Safety Guidelines", in the Maintenance CSOP before digging, drilling, or working in or near trenches or excavations. Supervisors shall ensure employees understand and follow these guidelines.

Caltrans Maintenance forces shall not enter any trench or excavation until a Supervisor or Superintendent has inspected the trench/excavation and the surrounding area to identify and/or correct any hazards. The Supervisor or Superintendent shall be competent and knowledgeable about soil classification, shoring/sloping techniques and requirements, access requirements, and the hazards of underground work. A job hazard assessment should be conducted and documented.

All trenches/excavations 5 feet or more in depth shall be shored or sloped. Shallower trenches/excavations shall be shored or sloped if needed. Also, a proper means of access (ladder, ramp, etc.) shall be required for all trenches/excavations.

If there is any doubt about the safety of an excavation, DO NOT ENTER. Obtain an engineering opinion and/or safety review before any work starts.

All work in trenches/excavations shall comply with the Construction Safety Orders, Article 6, Excavations (Title 8 CCR Sections 1540-1543).

8.33 Use of Recycled Water

Before employees use recycled water, they should be told about the potential health hazards involved with contact or accidental ingestion of recycled water. They should also be trained how to properly clean up after using it.

Contact with recycled water shall be kept to a minimum. Maintenance forces shall use impermeable (rubber) gloves and appropriate protective clothing. Supervisors should contact the local supplier to determine what other specific precautions should be taken.

Employees shall have clean water and soap available at the work site when using recycled water. Maintenance forces shall be instructed to wash their hands thoroughly before eating, drinking, smoking, or going to the bathroom.

More information on the use of recycled water is found in the Maintenance CSOP, Using Recycled Water.

8.34 Handling Chemicals and Hazardous Substances

Employees handling or exposed to hazardous materials shall be trained in the hazards, proper handling, use, and disposal of the material before use. The Safety Data Sheet (SDS) shall be reviewed and readily available. See Chapter 16, "Hazardous Materials Communication Program" of the Caltrans Safety Manual for specific requirements.

Employees responding to highway spills will follow Chapter D5 of the Maintenance Manual, Volume 1, the First Responder Operations Student Manual, and the Emergency Operations Plan.

All disposal and storage of waste shall comply with the Maintenance Hazardous Waste Manual.

Use of pesticides/herbicides shall comply with Chapter C2, Vegetation Control, of the Maintenance Manual, Volume 1.

Contact the supervisor, safety office, Maintenance Hazardous Materials Coordinator, or Maintenance Landscape Specialist, for additional help or assistance.

8.35 Radioactive Incidents

See Chapter D5, Spills of Substances on Highway Rights of Way and the First Responder Operational Student Manual.

8.36 Explosives

Care in handling and storing explosives are specified in Chapter 5, Blasting.

8.37 Working in Railroad/Transit Right of Way

- Employees performing work on a railroad, transit, or trolley line in which either:

  (a) equipment or materials will enter the right of way, or;

  (b) special hazards are present (i.e., limited visibility or frequent train movements) shall not enter the area unless all of the following occur:

    (1) Permission (oral or written) from the controlling entity (usually a railroad or transit company) has been granted.

    (2) Caltrans employees have received a safety briefing from the controlling entity. (A safety briefing is the minimal amount of training required to access a rail or transit right of way. Some entities will require completion of a formal training program or orientation specific to the rail/transit company's safety and operational procedures. In other situations, Roadway Worker Protection (RWP)1

[1] Most railroad crossings allow public access, but only for the purpose of crossing the tracks when safe to do so.

training will likely be required as determined by the controlling entity. These can be viewed as three progressively higher levels of training—a briefing, an orientation, and an orientation in combination with RWP training.)

(3) Caltrans employees are accompanied by a railroad or transit employee. (The railroad/transit representative usually referred to as a flag person or lookout watches for conflicting train movement that would endanger the crew or crews working in the foul of the tracks. The lookout will notify our crew each time there is a need to move personnel and equipment to a designated clearance area.)

- Employees performing work which requires entering a railroad or transit right of way where:

  (a) no equipment or materials will enter that right of way, and;

  (b) no special hazards are present, may enter provided the following safety procedures are carried out:

    (1) The person in charge has developed a work plan and conducted a safety briefing. The briefing shall include a review of this section with all employees who will be working on the railroad/transit right of way. The plan shall include a designated person to look out for trains when conditions warrant it.

    (2) Wear Caltrans Personal Protection Equipment for working in a right of way.

(3) Minimize their time in the right of way, and stay clear of tracks whenever possible.

(4) Obey instructions given by railroad/transit personnel encountered at the worksite and carry a Caltrans identification badge or card.

(5) Use designated entry points whenever possible. Do not climb over or under fences or walls. Do not pass through any holes in fences.

(6) Watch for moving equipment on tracks. Trains or other equipment may operate on any track, in either direction, at any time.

(7) When a train is approaching or passing by, seek to stand at least 50 feet from the tracks.

(8) In multiple track territory, do not stand on or close to one track while a train is passing on another track.

(9) Avoid walking or standing on a track. If it is necessary to walk or work on a track, do so along the outside of the track whenever possible. Look back frequently for on-track equipment to ensure adequate time to walk away from the tracks. When there is a good line of sight to see approaching trains, adequate time means that Maintenance forces can be clear of inbound trains 15 seconds before a train moving at the maximum operating speed on that track can pass the location of the Maintenance forces.

(10) Look in both directions before stepping onto a track, crossing a track, or walking around visual obstructions near a track.

(11) Do not step or walk on top of rails, frogs, switches, guard rails, etc.

(12) Keep at least 20 feet from standing equipment. Do not cross between cars or other on-track equipment standing on the same track unless they are separated by at least 50 feet.

Supervisors are responsible for requesting permission from the rail entity and ensuring that the procedures listed above are fulfilled. In order to secure an on-site railroad/transit representative, contact the railroad or transit entity as soon as possible and a minimum of three days prior to the planned work. The Caltrans District Right of Way office can provide contact information for railroad/transit entities in their area.

Caltrans railroad/transit safety procedures apply equally to all work in railroad right of ways, railroad crossings[1] and to work on or near rail, transit, or trolley lines that run within our right of way when the work is in the "fouling distance" of the rail line. (The fouling distance is any area in which personnel, equipment or materials could be struck by the widest vehicle that could operate on that track or in any case is within 4 feet of the field side of the near running rail.)

These are basic procedures. If the work will involve frequent access and/or work in many different rail/transit company right of ways, the supervisor should require specialized railroad safety training for each

[1] Most railroad crossings allow public access, but only for the purpose of crossing the tracks when safe to do so.

employee to include RWP[1] and safety orientations by the railroad/transit entities owning the right of ways.

Note: Federal railroad safety laws are enforced by the Federal Railroad Administration (FRA). RWP information is covered in 49CFR214.
The California Public Utilities Commission (CPUC) regulates freight, commuter, and transit in the State of California. Their authority is based in State law and both the FRA and the Federal Transit Administration delegate Federal Authority.
Supervisors should take advantage of the safety training resources available on the FRA and CPUC websites.

8.38 Caltrans Injury and Illness Prevention Program (IIPP)

8.38.01 Purpose

The California Department of Transportation (Caltrans) is committed to maintaining a safe and healthful working environment. Management will provide all necessary safeguards, programs, and equipment to reduce the potential for accidents and injuries.

8.38.02 Policy

Caltrans policy is to conduct business in the safest manner possible while adhering to all State and Federal laws and all rules and regulations relating to occupational safety and health.

[1] On-track safety procedures prescribed under Federal RWP Regulation 49 CFR, Part 214, Subpart C.

8.38.03 Statutes/Regulations

The Injury and Illness Prevention Program (IIPP) provides the procedures for complying with the requirements of California Division of Occupation Safety and Health's (Cal/OSHA's) California Code of Regulations (CCR) Title 8, Subchapter 7, General Industry Safety Orders (GISO), 3203, Injury and Illness Prevention Program. The IIPP is an authoritative source of information to assist managers, supervisors and employees in promoting the health and safety of all Caltrans staff.

8.38.04 Responsibilities

The IIPP is designed to prevent workplace incidents, injuries, and illnesses. Each employee is responsible for supporting the safety program and performing their duties in a manner that assures his or her own personal safety and the safety of others. To succeed in this endeavor, all employees must adopt proper and cooperative attitudes towards injury and illness prevention.

A successful IIPP can only be achieved and maintained when there is active interest, participation, and accountability at all levels of the organization. The Caltrans Director has the authority and responsibility to implement that the IIPP is implemented.

All managers, supervisors, lead personnel, Headquarters Division and District Health and Safety staff have delegated responsibility for implementing and maintaining to confirm compliance with the IIPP in their work areas and for answering employee questions about the program.

For a list of responsibilities in this program, please refer to Director's Policy DP-03, Safety and Health.

8.38.05 Compliance

Managers and supervisors promote compliance with the IIPP by:

- Informing employees of the Caltrans IIPP and how to access all related safety documentation on Caltrans intranet.
- Effectively communicating and endeavoring to assure that all safety and health laws, rules, policies and procedures are understood by all employees, and enforcing those laws, rules, policies and procedures fairly and uniformly.
- Investigating and documenting all injuries, illnesses and unsafe work conditions and maintaining records of the safety inspections.
- Evaluating the safety performance of all employees.
- Providing training to employees whose safety performance is deficient.
- Recognizing employees who perform safe and healthful work practices in an exceptional manner.
- Disciplining workers who violate safe and healthful work practices.

All employees comply with the IIPP by:

- Maintaining a safe and secure work environment by adhering to all employee responsibilities and complying with Caltrans policies, procedures, and safe work practices.

Willful or neglectful failure to comply with the provisions in the IIPP may subject the employee to the progressive disciplinary process of utilizing increasingly severe steps to correct a problem after being given a reasonable opportunity to do so.

8.38.06 Communication

Caltrans is dedicated to maintaining open, two-way communication between management and employees on matters pertaining to health and safety. Caltrans values and encourages active participation in the safety program.

Supervisors

Supervisors will communicate to employees all health and safety information necessary to complete their job duties safely. Supervisors are also responsible to answer questions about the IIPP and follow-up on safety issues raised by their employees. The following system of communication facilitates a continuous flow of health and safety information between management, employees, and designated representatives in a form that is readily understandable and consists of the following:

- New employee orientation, which includes a discussion of safety and health policies and procedures.
- A review of the Caltrans IIPP and how to access all related safety documentation on Caltrans intranet.
- Instruct employees on how to locate and review the Caltrans Safety Manual.
- Conduct and document safety meetings to discuss health and safety matters, specific workplace hazards, and encourage open discussions on employee concerns without fear of reprisal of Chapter 2, Safety Meetings, of the Caltrans Employee Safety Manual.
- Informing employees about the Caltrans Safety Suggestion Hotline (855-836-3652), which can be used by employees to anonymously inform management about workplace hazards.

- Post and distribute health and safety information.
- A Safety Bulletin Board shall be installed in a place visible to employees in each building in which employees are located. The Safety Bulletin Board must meet the legal posting requirements of Cal/OSHA, the U.S. Department of Labor, and other State and Federal regulatory posting requirements.

8.38.07 Hazard Assessment

Safety inspections identify and evaluate workplace hazards and conditions that could result in illness, injury, or property damage if not corrected. Safety inspections are required at all Caltrans owned, rented, or leased facilities and include the grounds, parking lots, loading docks, driveways, and perimeter fence areas adjacent to Caltrans facilities.

All employees are encouraged to report existing or potentially hazardous work conditions or unsafe work practices promptly. Safety concerns or suggestions may be made:

- during safety meetings, safety stand downs, or individually to a supervisor.
- on the Office of Health and Safety webpage.
- by anonymously calling the local District Safety Office.
- by anonymously calling the Headquarters Office of Employee Health and Safety toll free number at 855-836-3652 or main office phone number at 916-227-2640.

Building managers, District Safety Officers/Safety Specialists or individuals responsible for operating a Caltrans facility are to establish an inspection schedule for each facility under their jurisdiction. Inspections shall be conducted and documented on form ADM-4020

(Facility Safety Inspection Program) whenever conditions warrant, but **no less than once a year.**

Managers, supervisors, and employees are expected to cooperate with building managers, District Safety Officers/Safety Specialists, or facility personnel during safety inspections. The District or Headquarters Office of Employee Health and Safety staff are available to assist and/or participate in conducting formal safety inspections.

Inspections shall be made to identify and evaluate hazards:

- Whenever new substances, processes, procedures, or equipment which present potential new hazards are introduced into the workplace.
- When new or previously unidentified hazards are recognized.
- When occupational injuries or illnesses occur.
- When employees are hired and/or reassigned to processes, operations, or tasks for which a hazard evaluation has not been conducted.
- Whenever workplace conditions warrant an inspection.

Building managers, District Safety Officers/Safety Specialists, or individuals responsible for operating a Caltrans facility maintain safety inspection records and reports for that facility as required in section 8.38.12 Recordkeeping.

For additional information and guidance, please see **Chapter 3, Facility Safety Inspections**, of the Caltrans Employee Safety Manual.

8.38.08 Incident Investigation

An incident is an unplanned event which results in an injury, illness, property damage and/or the interruption of a process. It also includes near-miss events that did not result in an incident, injury, illness, or damage. Incidents are reported and investigated to implement procedures to reduce future occurrences.

Caltrans endeavors to provide a safe working environment for employees and strives to eliminate avoidable occupational incidents. If an incident occurs, it is the employee's responsibility to **immediately** report the incident to their supervisor. Other employees that witness the incident also must report it to their supervisor.

It is Caltrans policy that all investigations are conducted by a supervisor, safety officer/safety specialist, or a designated employee familiar with the work practices and procedures and shall include:

- Visiting the scene as soon as possible;
- Interviewing affected workers and witnesses;
- Examining the workplace for factors associated with the incident/exposure/near-miss incident;
- Determining the causes of the incident/exposure/near-miss incident;
- Taking corrective action to prevent the incident/exposure/near-incident from reoccurring; and
- Recording the findings and corrective actions taken.

8.38.09 Hazard Correction

Hazard levels range from being imminently dangerous to relatively low risk. Corrective actions or plans, including a suitable estimation date for

completion, are the responsibility of the Program/Division where the hazard is located.

Corrective actions or plans must be appropriate for the severity of the hazard and must be **documented**.

- All hazards should be corrected promptly.
- If an imminent danger hazard exists, work in the area must cease, and the appropriate supervisor or responsible person in charge must be contacted. If the hazard cannot be immediately corrected without endangering employees or property, specific actions may include stopping a work activity or taking any other measures necessary to protect employees, the public, the facility, and/or equipment. The hazard must be corrected, and the unsafe condition abated.

8.38.10 Training

All employees shall participate in periodic safety training where topics relevant to the workplace are reviewed and discussed. Safety training meetings can include status reports on safety inspections, hazard mitigation projects, incident investigation results, and employee safety suggestions.

Safety trainings can be incorporated into staff meetings, presented during “tailgate” meetings, or conducted via one-on-one coaching. The duration of safety meetings can vary based on the subject and training format.

Training and instruction shall be provided:

- When the IIPP is updated.

- To all new employees.
- To all employees given new job assignments for which training has not been provided.
- Whenever new substances, processes, procedures or equipment are introduced to the workplace and represent a new hazard.
- Whenever Caltrans knows of a new or previously unrecognized hazard.
- For supervisors, to familiarize them with the safety and health hazards to which workers under their immediate direction and control may be exposed.
- To all employees regarding hazards specific to their job assignment.

Training shall also be given for all workplace safety and health practices, which include, but are not limited to:

- An explanation of Caltrans IIPP, emergency action and fire prevention plans, and measures for reporting any unsafe conditions, work practices, injuries and/or when additional instruction is needed.
- Availability of toilet, hand-washing, and drinking water facilities.
- Provisions for medical services and first aid, including emergency procedures.
- Proper housekeeping, such as keeping stairways and aisles clear, work areas neat and orderly, and cleaning up spills promptly.
- Prohibition of horseplay, scuffling, or other acts that adversely affect safety.
- Proper storage to prevent stacking goods in an unstable manner, storing materials and goods against doors, exits, fire extinguishing equipment and electrical panels.
- Heat Illness Prevention Plan

- Specific instructions to workers regarding hazards unique to their job assignment, if such information was not already covered in other training
- Where applicable our training may also include:
    - Prevention of musculoskeletal disorder, such as sprains and strains, with instructions on proper lifting techniques.
    - Use of appropriate clothing, including gloves, footwear, and other personal protective equipment; and
    - Information about chemical hazards to which employees could be exposed and other hazard communication program information.

Employee training must be provided at no cost to the employee during the employee's normal working hours. Safety training may be provided by a knowledgeable supervisor or competent person, or by representatives from other relevant divisions, or approved vendors.

All safety training must be documented and kept on file. To document training, use the PM-S-0110 (Safety Meeting Report) form. The documentation must include:

- Date of training
- Name of trainer(s)
- Title of trainer/Trainer affiliation
- Topic(s) covered
- Title of video(s) viewed, if any
- Printed name and signature of each attendee and their program/division
- An outline and/or training handout/pamphlet of safety topic covered
- Learning Management System (LMS) code (if available)

8.38.11 Employee Access to Caltrans IIPP

Caltrans provides unobstructed access to the IIPP through the Department intranet website (https://hs.onramp.dot.ca.gov/employee-safety-manual-online), which allows all Caltrans employees – or their designated representatives – to review, print, and email the current version of the IIPP.

If the electronic copy is not accessible, one printed copy of the IIPP will be provided free of charge. If the employee or designated representative requests additional copies of the Program within one (1) year of the previous request and the IIPP has not been updated with new information since the prior copy was provided, reasonable, non-discriminatory reproduction costs may be charged for the additional copies.

An employee must provide written authorization to their supervisor in order to make someone their "designated representative." A recognized or certified collective bargaining agent will be treated automatically as a designated representative for the purpose of access to the IIPP. The written authorization must include the following information:

- The name and signature of the employee authorizing the designated representative.
- The date of the request.
- The name of the designated representative.
- The date upon which the written authorization will expire (if less than 1 year).

8.38.12 Recordkeeping

Cal/OSHA regulations require that records for safety inspections, hazard correction, safety training, incident investigation, occupational injuries and illnesses, medical surveillance, exposure monitoring, and other safety activities be maintained for specific periods of time. Records must be retained for this period and Caltrans must present them to Cal/OSHA or other regulatory agency representatives, if requested.

These records must be kept on file by the Manager/Supervisor for the minimum times stated below:

TYPE OF RECORD	RECORD RETENTION
Safety Inspection Forms and Corrective Action Sheets*	1 year
Incident Investigation Forms	1 year
Employee Training Forms	
Personnel Records	Duration of employment
Safety Meetings and Training Sign-up Sheets	1 year
Personnel Records Relating to Communication and Enforcement	
Employee Suggestion/Question and Responses	3 years
Disciplinary Actions due to lack of safety compliance	3 years
All other safety records	3 years
*Employee Exposure Records (Subject to Title 8 CCR 3204)	30 years
**Medical Records (Subject to Title 8 CCR 3204)	Duration of employment plus 30 years
The Office of Employee Health and Safety will retain:	
The Written IIPP	Indefinitely
Cal/OSHA Log 300 Forms	5 years

**The yearly retention schedule for safety inspections and hazard correction sheets are based on the annual inspection requirements explained in Section 1.06 (Hazard Correction).*

***Access to employee medical records will be limited under Caltrans policies and state and federal mandates.*

8.39 Accident Response and Reporting

Should an accident occur involving a state Maintenance force or equipment, those Maintenance forces present should immediately:

- Assure appropriate medical needs are taken care of
- Notify the first line supervisor and the local Transportation Management Center
- Secure the site to minimize the risk of additional accidents.

Follow-up reporting will be needed when an accident involves an employee or equipment. The first line supervisor is responsible to be sure all needed reports are completed and submitted on time. For further details on reporting accident see Caltrans Safety and Health Manual, Chapter 4 “Accident Investigation and Analysis”.

8.40 The Use of Road Flares

No activities that have the potential of starting a fire should begin before Maintenance staff consult daily distribution of Caltrans Daily Fire Danger Ratings and localized weather reports to ensure that all parameters of this policy are followed.

8.40.01 Before Road Flare Use

For static operations, consider alternative products such as electronic flares.

For moving operations/closures, consider Maintenance Zone Enhanced Enforcement Program (MAZEEP), additional shadow vehicles or Portable Changeable Message Signs (PCMS) instead of flares.

Managers and Supervisors shall ensure employees are familiar with their Districts' Fire Risk Management Plan.

The Maintenance Superintendent and Supervisor shall ensure that each member of the Maintenance crew has received instruction on the proper inspection, deployment, and disposal of road flares before use on the job. Please refer to the latest Code of Safe Operation Practices (CSOP) "Use of Road Flares".

If using a Truck Mounted Fusee Igniter, ensure the Maintenance crew is familiar with the "Truck Mounted Fusee Igniter" CSOP.

Road flares should be inspected prior to their use.

Loose caps should be tightened.

Road flares that are wet, leaking, expired, missing any portion of the paperboard covering, cap or cap wings, or otherwise damaged should not be used.

Separate damaged road flares for immediate disposal.

Dispose of damaged road flares in hazardous waste storage for proper disposal of perchlorate-containing substances, in accordance with the Caltrans Memorandum, "Perchlorate Best Management Practices," (May 2006).

8.40.02 During Road Flare Use

Use the least amount of road flares as possible without compromising safety.

Consider the use of alternative, non-flammable signal aids in lieu of road flares where practicable and safety is not compromised. Crews are authorized and encouraged to request CHP assistance.

When road flares are used, Maintenance Supervisor shall ensure that the job site is patrolled and monitored to ensure that road flares remain on the pavement and are extinguished.

Partially-burned flares that are extinguished before they burn out completely as manufactured may contain perchlorate and should be safely removed from the job site where possible and disposed of in hazardous waste storage.

Where possible, Maintenance Supervisors, Superintendents, and/or Managers should monitor weather conditions by accessing local National Oceanic and Atmospheric Administration (NOAA) weather data.

8.40.03 In areas with combustible materials[1] adjacent to the roadway, except in emergencies:

- During extreme (red flag) Fire Weather Conditions, the use of road flares is prohibited. Planned activities that need road flares shall be canceled.

[1] Combustible material includes trees, brush, grasses, and other vegetation in sufficient quantity to start and maintain a fire.

- During high (yellow flag) and very high (orange flag) Fire Weather Conditions, operations shall include a skid-mounted or similar self-contained pump and tank unit. This unit shall be mounted on a vehicle and capable of carrying and pumping 200 gallons of water, per the "Fire Prevention Guidelines".

If road flare use is necessary for emergencies during these weather events, a vehicle equipped with fire-extinguishing equipment shall be used in order to monitor and address flares until they have been entirely extinguished.

Call 9-1-1 and radio the local Traffic Management Center (TMC) to inform dispatch and request emergency fire response when a fire incident occurs that cannot be immediately resolved with fire suppression equipment readily available to the crew.

APPENDIX A

Instructions for Use of Underground Service Alert (USA)

USA is a free notification service for persons who plan to dig, blast, trench, drill, or conduct any other underground excavation project that has the potential to disturb underground pipelines or utilities. 4216 (g) "Excavation" means any operation in which earth, rock, or other material in the ground is moved, removed, or otherwise displaced by means of tools, equipment. Or explosives in any of the following ways: grading, trenching, digging, auguring, tunneling, scraping, cable or pipe plowing and driving, or any other way. USA will identify if there are utilities or pipelines underground in the area of planned work.

1. How USA Works

   The person planning an excavation calls USA at least 2 days in advance of planned work. A USA operator will take the location request information, verify the location, and send it to all USA members that may be involved at the proposed excavation site.

   The USA members that are notified will check their records to determine if they have underground facilities at the site.

   The caller will be advised by telephone that the USA member does not have facilities at the excavation site.

   If a USA member does have facilities at the site, one of its employees will respond to the caller. The employee will provide information about the member's facilities, or will stake and mark the horizontal path of the facilities.

2. Advance Notice

   The Underground Service Alert Center is designed for planned work operations. Each location request is good for a period of 14 calendar days. Contact USA at least two (2) working days prior to the start of actual work operations.

3. USA Northern California Service Area

   Underground Service Alert (USA)
   4005 Port Chicago Hwy., Suite 100
   Concord, CA 94520
   811 / (800) 642-2444, www.usanorth811.org

   Contact Center hours of operation: 24/7

   Serves the following counties in Northern & Central California:

   Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Kern, Kings, Lake, Lassen, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Napa, Nevada, Placer, Plumas, Sacramento, San Benito, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Yolo, and Yuba.

4. USA Southern California Service Area Underground Service Alert

   811 / (800) 422-4133, www.digalert.org

Serves the following counties in Southern California:

Imperial, Inyo, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, and Ventura

Contact Center hours of operation: Monday–Friday, 6 a.m.–7 p.m., excluding holidays.

USA Holidays include the following:

New Year's Day
Martin Luther King Jr. Day
Lincoln's Birthday
Presidents Day
Cesar Chavez Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veterans Day
Thanksgiving Day (and the Friday after)
Christmas Day

5. Emergency Excavations

Emergencies during normal working hours of the Center will be processed as promptly as possible. Emergencies after hours should be called directly to the organizations whose facilities are involved.

6. Color Code for Excavations

Paint outline of proposed excavation area with white dotted line.

7. Color Coded Surface Marks Used by USA Members

Marks and markers indicate the name, initials or logo of the company that owns or operates the line, and width of the facility if it is greater than 2" (50 mm).

The following indicates the color code used by USA members:

- Red: electric power lines, cables, conduit and lighting cables
- Orange: telecommunication, alarm or signal lines, cables or conduit
- Yellow: natural gas, oil, steam, petroleum or other flammables
- Green: sewers and drain lines
- Blue: drinking water
- Purple: reclaimed water, irrigation and slurry lines
- Pink: temporary survey markings, unknown/unidentified facilities
- White: proposed excavation limits or routes

Contact USA directly with any questions regarding the color coding system or markers used by USA members.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Charles D Suszko
REGISTERED CIVIL ENGINEER

August 1, 2022
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Charles D. Suszko
No. C43029
Exp. 3-31-24
CIVIL
STATE OF CALIFORNIA

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TABLE 1

TAPER LENGTH CRITERIA AND CHANNELIZING DEVICE SPACING							
SPEED (S)	MINIMUM TAPER LENGTH * FOR WIDTH OF OFFSET 12 FEET (W)				MAXIMUM CHANNELIZING DEVICE SPACING		
					X	Y	Z **
	TANGENT 2L	MERGING L	SHIFTING L/2	SHOULDER L/3	TAPER	TANGENT	CONFLICT
mph	ft	ft	ft	ft	ft	ft	ft
20	160	80	40	27	20	40	10
25	250	125	63	42	25	50	12
30	360	180	90	60	30	60	15
35	490	245	123	82	35	70	17
40	640	320	160	107	40	80	20
45	1080	540	270	180	45	90	22
50	1200	600	300	200	50	100	25
55	1320	660	330	220	50	100	25
60	1440	720	360	240	50	100	25
65	1560	780	390	260	50	100	25
70	1680	840	420	280	50	100	25
75	1800	900	450	300	50	100	25

* - For other offsets, use the following merging taper length formula for L:
For speed of 40 mph or less, $L = WS^2/60$
For speed of 45 mph or more, $L = WS$

Where: L = Taper length in feet
W = Width of offset in feet
S = Posted speed limit, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

** - Use for taper and tangent sections where there are no pavement markings or where there is a conflict between existing pavement markings and channelizers (CA).

TABLE 2

LONGITUDINAL BUFFER SPACE AND FLAGGER STATION SPACING				
SPEED *	Min D **	DOWNGRADE Min D ***		
		-3%	-6%	-9%
mph	ft	ft	ft	ft
20	115	116	120	126
25	155	158	165	173
30	200	205	215	227
35	250	257	271	287
40	305	315	333	354
45	360	378	400	427
50	425	446	474	507
55	495	520	553	593
60	570	598	638	686
65	645	682	728	785
70	730	771	825	891
75	820	866	927	1003

* - Speed is posted speed limit, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

** - Longitudinal buffer space or flagger station spacing

*** - Use on sustained downgrade steeper than -3 percent and longer than 1 mile.

TABLE 3

ADVANCE WARNING SIGN SPACING			
ROAD TYPE	DISTANCE BETWEEN SIGNS *		
	A	B	C
	ft	ft	ft
URBAN - 25 mph OR LESS	100	100	100
URBAN - MORE THAN 25 mph TO 40 mph	250	250	250
URBAN - MORE THAN 40 mph	350	350	350
RURAL	500	500	500
EXPRESSWAY / FREEWAY	1000	1500	2640

* - The distances are approximate, are intended for guidance purposes only, and should be applied with engineering judgment. These distances should be adjusted by the Engineer for field conditions, if necessary, by increasing or decreasing the recommmended distances.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM TABLES FOR LANE AND RAMP CLOSURES

T9

6-24-22

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August 1, 2022
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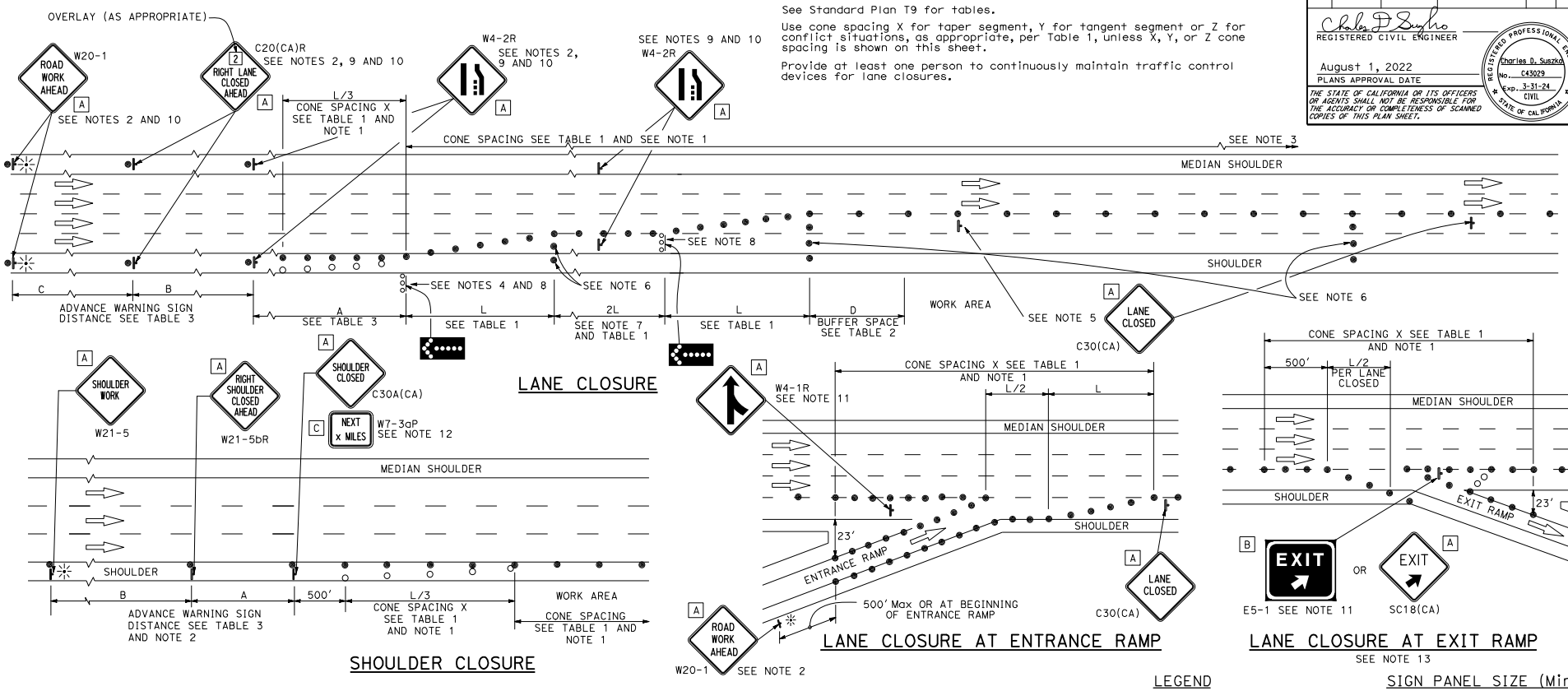
NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.



NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign, with minimum size of 48" x 24" as appropriate, shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. A minimum 1500' sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest verticle curve or on a horizontal curve.
5. Place a C30(CA) sign every 1000 ' throughout length of lane closure.
6. A minimum of 3 cones shall be placed transversely across each closed lane and shoulder at each location where a taper across a traffic lane ends and every 1000' as shown on the "Lane Closure" detail. Two type II barricades may be used instead of the 3 cones. The transverse alignment of the cones or barricades on the closed shoulder may be shifted from the transverse alignment to provide access to the work.
7. The 2L tangent shown along lane lines shall be used between the L tapers required for each closed traffic lane.
8. Use one flashing arrow sign for each lane closed. The flashing arrow sign shall be Type I.
9. Median lane closures shall conform to the details as shown except that C20(CA)L and W4-2L signs shall be used.
10. Duplicate sign installations are not required:
    a) On opposite shoulder if at least one-half of the available lanes remain open to traffic.
    b) In the median if the width of the median shoulder is less than 8' and the outside lanes are to be closed.
11. The E5-1 or SC18(CA) and W4-1 signs shall be used as shown.
12. A W7-3aP "NEXT _____ MILES" plaque must be used if the shoulder closure extends beyond the distance that can be perceived by road users.
13. For the warning sign requirements at the Exit Ramp, when work is proposed on the local street, see CA MUTCD Figure 6H-22 to 6H-27.

LEGEND		SIGN PANEL SIZE (Min)	
●	TRAFFIC CONE	A	48" x 48"
○	TRAFFIC CONE (OPTIONAL TAPER)	B	72" x 60"
	TEMPORARY TRAFFIC CONTROL SIGN	C	36" x 30"
	FLASHING ARROW SIGN (FAS)		
	FAS SUPPORT OR TRAILER		
	PORTABLE FLASHING BEACON		

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON FREEWAYS AND EXPRESSWAYS

NO SCALE

T10

6-24-22

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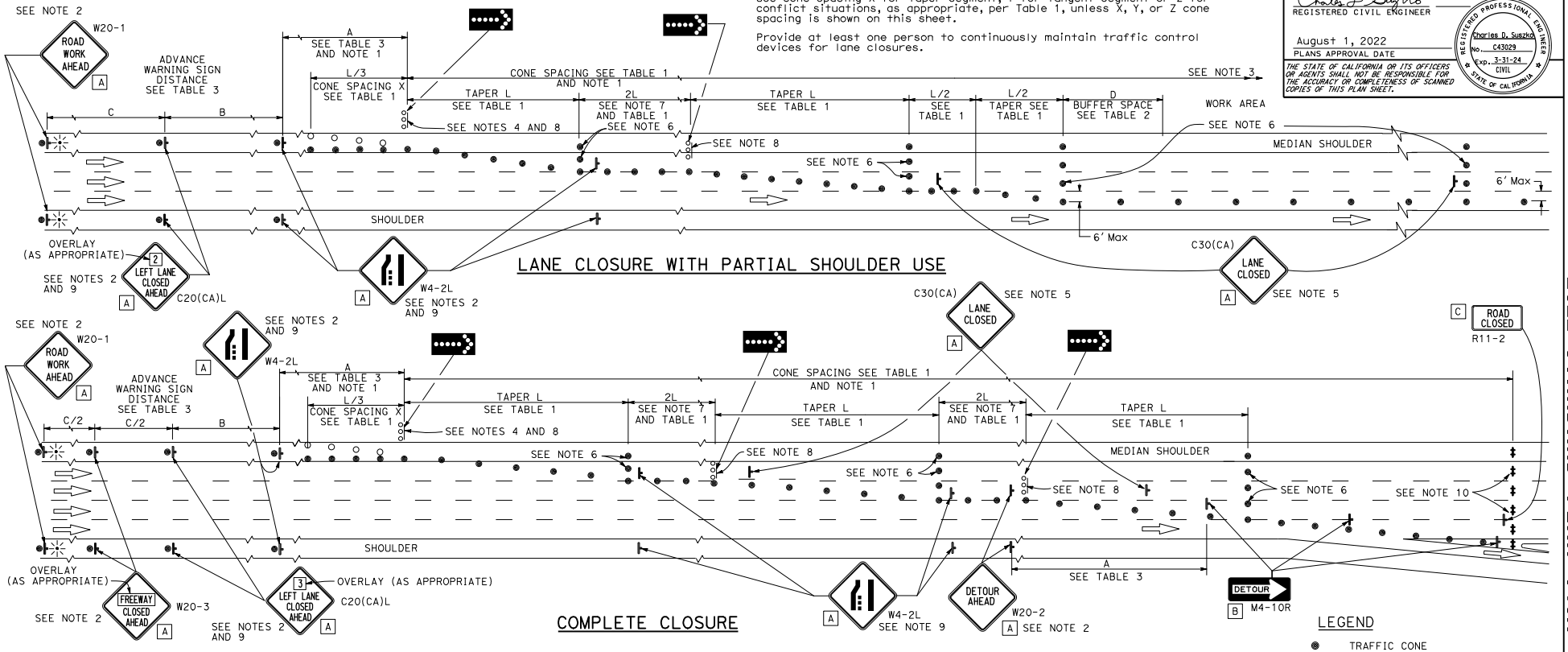
NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.



NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign, with minimum size of 48" x 24" as appropriate, shall be placed at the end of the lane closure unless the end of work area is obvious or ends within a larger project's limits.
4. A minimum 1500' of sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest vertical curve or on a horizontal curve.
5. Place a C30(CA) sign every 1000 ' throughout length of lane closure.
6. A minimum of 3 cones shall be placed transversely across each closed lane and shoulder at each location where a taper across a traffic lane ends and every 1000' as shown on the "Lane Closure with Partial Shoulder USE" detail. Two type II barricades may be used instead of the 3 cones. The transverse alignment of the cones or barricades on the closed shoulder may be shifted from the transverse alignment to provide access to the work.
7. The 2L tangent shown along lane lines shall be used between the L tapers required for each closed traffic lane.
8. Use one flashing arrow sign for each lane closed. The flashing arrow sign shall be Type I.
9. Lane closures on the right side using partial median shoulder as a traffic lane shall conform to the details shown except that C20(CA)R and W4-2R signs shall be used.
10. A minimum of Two Type II or III barricades shall be placed across each closed lane and shoulder at the location shown and every 2000' within the complete closure area. Within the complete closure area, the transverse alignment of the barricades on the closed shoulder may be shifted from the transverse alignment to provide access to the work.

SIGN PANEL SIZE (Min)

- A 48" x 48"
- B 48" x 18"
- C 48" x 30"

LEGEND

- TRAFFIC CONE
- TRAFFIC CONE (OPTIONAL TAPER)
- TEMPORARY TRAFFIC CONTROL SIGN
- FLASHING ARROW SIGN (FAS)
- FAS SUPPORT OR TRAILER
- PORTABLE FLASHING BEACON

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON FREEWAYS AND EXPRESSWAYS

NO SCALE

T10A

6-24-22

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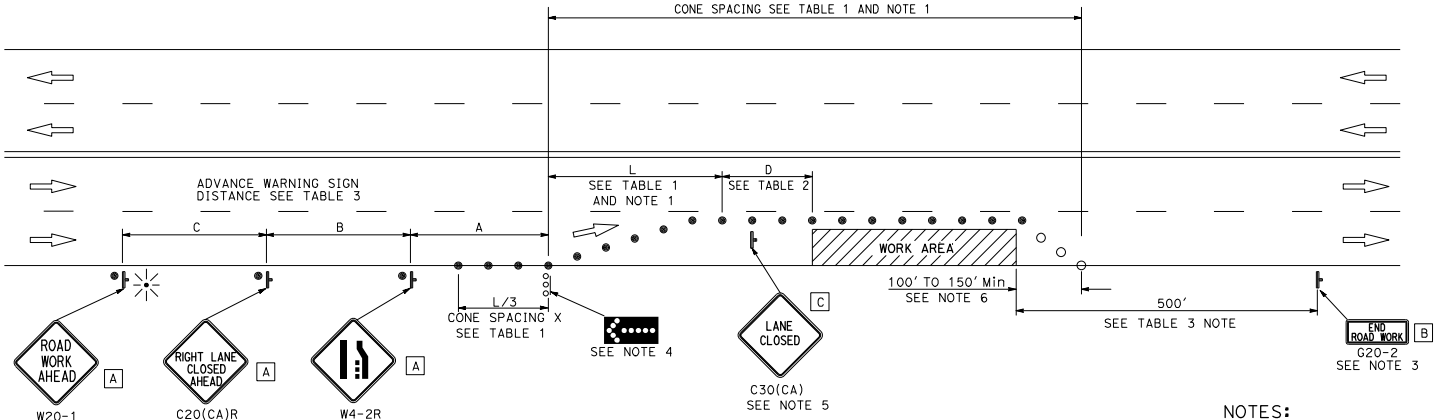

TYPICAL LANE CLOSURE

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.

LEGEND

- TRAFFIC CONE
- TRAFFIC CONE (OPTIONAL TAPER)
- TEMPORARY TRAFFIC CONTROL SIGN
- FLASHING ARROW SIGN (FAS)
- FAS SUPPORT OR TRAILER
- PORTABLE FLASHING BEACON

SIGN PANEL SIZE (Min)

- A 48" x 48"
- B 36" x 18"
- C 30" x 30"

NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. A minimum 1500' of sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest vertical curve or on a horizontal curve.
5. Place C30(CA) "LANE CLOSED" sign at 500' to 1000' intervals throughout extended work area.
6. Length may be reduced by the Engineer to address site conditions.
7. Median lane closures shall conform to the details shown except that C20(CA)L and W4-2L signs shall be used.
8. For approach speeds over 50 MPH, use the "Traffic Control System for Lane Closure on Freeways and Expressways" plan for lane closure details and requirements.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ON MULTILANE CONVENTIONAL HIGHWAYS

NO SCALE

T11

6-24-22

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Charles D. Suszko
REGISTERED CIVIL ENGINEER

August 1, 2022
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Charles D. Suszko — No. C43029 — Exp. 3-31-24 — CIVIL — STATE OF CALIFORNIA

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LEGEND

- TRAFFIC CONE
- TEMPORARY TRAFFIC CONTROL SIGN
- FLASHING ARROW SIGN (FAS)
- FAS SUPPORT OR TRAILER
- PORTABLE FLASHING BEACON

SIGN PANEL SIZE (Min)

- [A] 48" x 48"
- [B] 24" x 24"
- [C] 36" x 18"

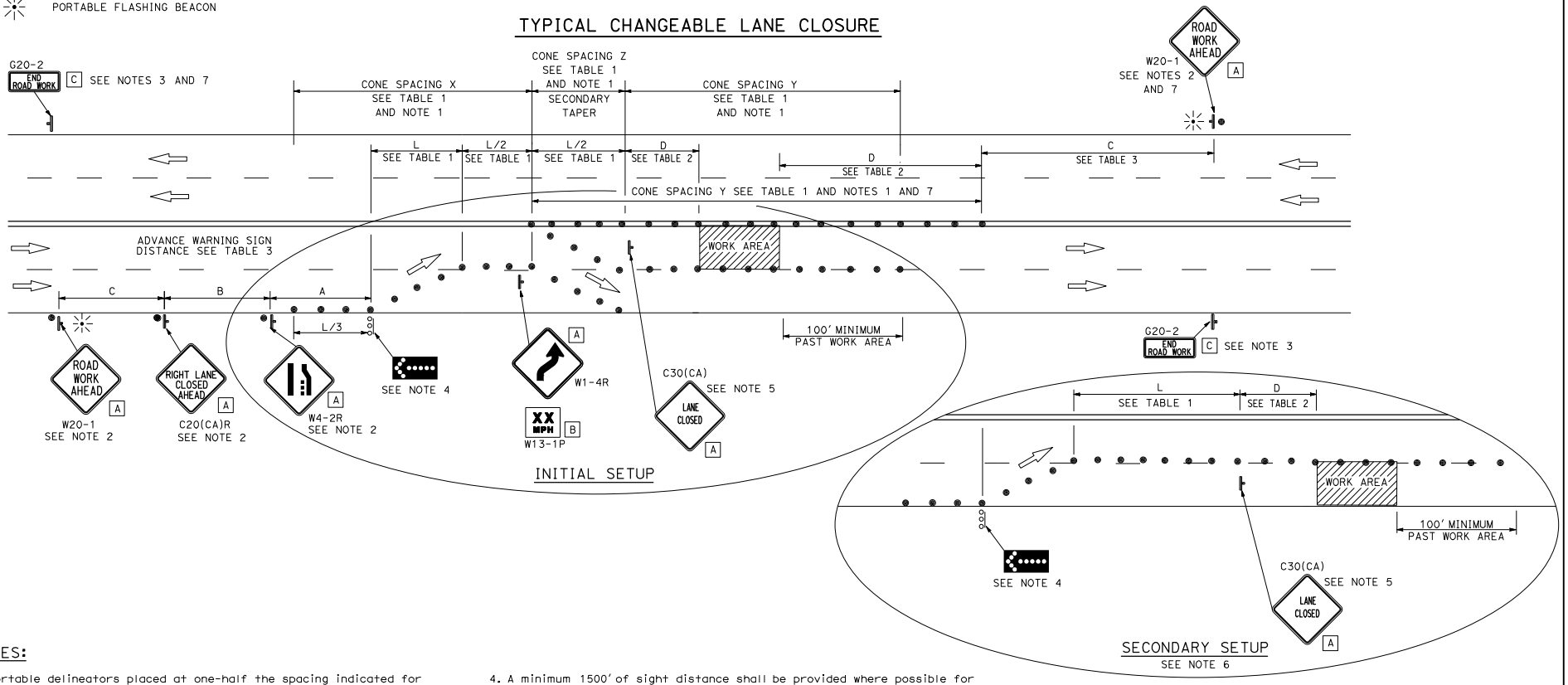
NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.

TYPICAL CHANGEABLE LANE CLOSURE



NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacon shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. A minimum 1500' of sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest vertical curve or on a horizontal curve.
5. Place C30(CA) "LANE CLOSED" sign at 500' to 1000' intervals throughout extended work area.
6. Relocate secondary taper to tangent location and relocate C30(CA) sign. Remove W1-4R/W13-1P sign package.
7. Sign installations and cones are not required when a median barrier is in place.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR CHANGEABLE LANE CLOSURE ON MULTILANE CONVENTIONAL HIGHWAYS AND EXPRESSWAYS

NO SCALE

T11A

6-24-22

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LEGEND

- TRAFFIC CONE
- TEMPORARY TRAFFIC CONTROL SIGN
- FLASHING ARROW SIGN (FAS)
- FAS SUPPORT OR TRAILER
- PORTABLE FLASHING BEACON

SIGN PANEL SIZE (Min)

- [A] 48" x 48"
- [B] 24" x 24"
- [C] 36" x 18"

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Charles D Suszko
REGISTERED CIVIL ENGINEER

August 1, 2022
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Charles D. Suszko
No. C43029
Exp. 3-31-24
CIVIL
STATE OF CALIFORNIA

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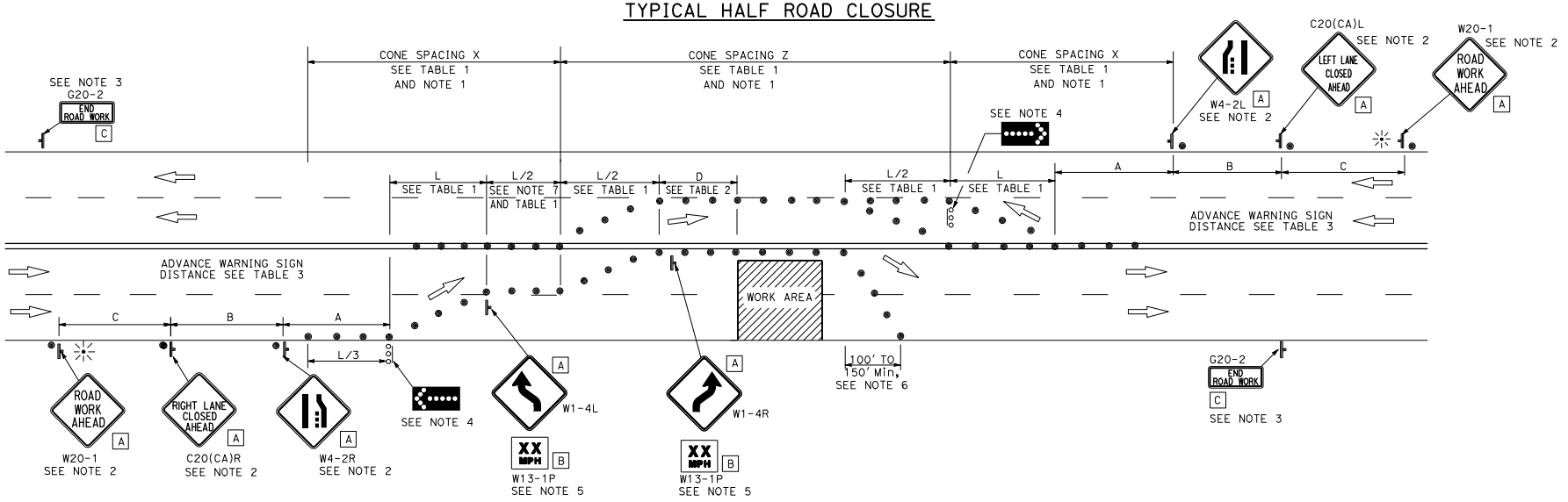
TYPICAL HALF ROAD CLOSURE



NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. Flashing beacons shall be placed at the locations indicated for lane closure during hours of darkness.
3. A G20-2 "END ROAD WORK" sign, shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. A minimum 1500' sight distance shall be provided where possible for vehicles approaching the first flashing arrow sign. Lane closures shall not begin at the top of crest verticle curve or on a horizontal curve.
5. Advisory speed will be determined by the Engineer, The W13-1P Plaque will not be required when advidory speed is more than the posted or maximum speed limit.
6. Length may be reduced by the Engineer to address site conditions.
7. The tangent (L/2) shall be used.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR HALF ROAD CLOSURE ON MULTILANE CONVENTIONAL HIGHWAYS AND EXPRESSWAYS

NO SCALE

T12

6-24-22

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Charles D Suszko
REGISTERED CIVIL ENGINEER

August 1, 2022
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Charles D. Suszko
No. C43029
Exp. 3-31-24
CIVIL
STATE OF CALIFORNIA

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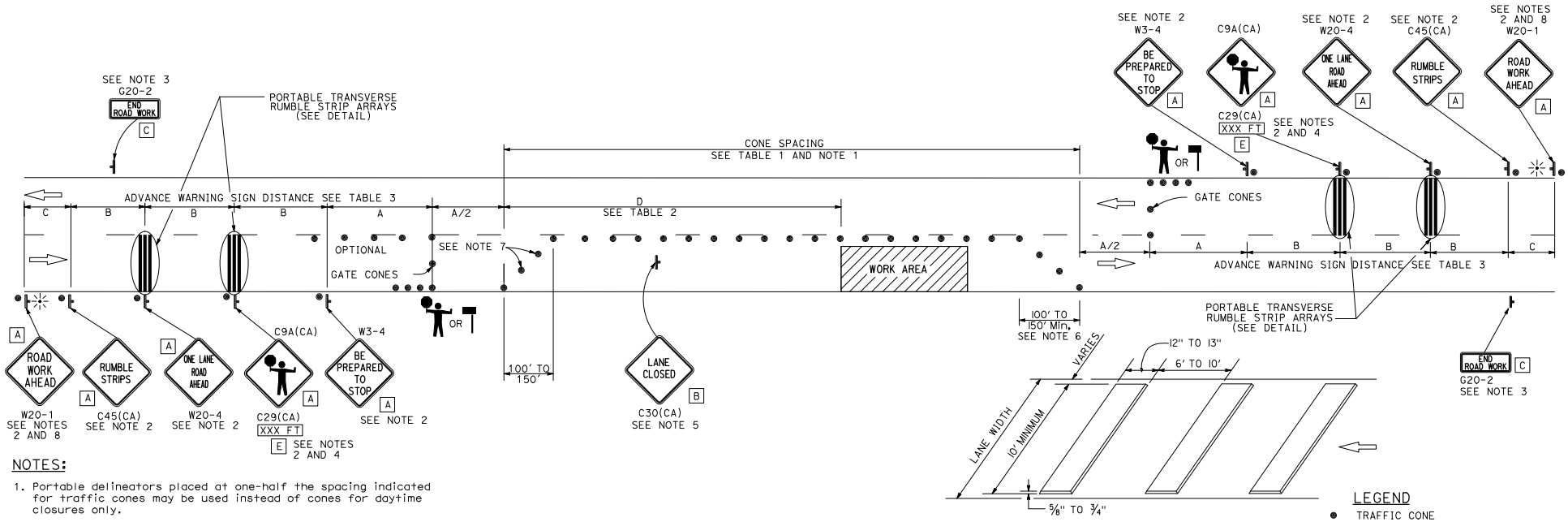
NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.



NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Sign must be equipped with at least two flags for daytime closures. Flags must be orange in color and at least 16 inches by 16 inches in size. Place flashing beacons as shown for closures during hours of darkness.
3. A G20-2 "END ROAD WORK" sign, shall be placed at the end of the lane closure unless the end of work area is obvious or ends within the larger project's limits.
4. An optional C29(CA) sign may be placed below the C9A(CA) sign.
5. Place C30(CA) "LANE CLOSED" sign at 500' to 1000' intervals throughout extended work area. They are optional if the work area is visible from the flagger station.
6. Length may be reduced by the Engineer to address site conditions.
7. Either traffic cones or barricades shall be placed on the taper. Barricades shall be Type I, II, or III.
8. If C45(CA) is not used, measure distance C from W20-4.

PORTABLE TRANSVERSE RUMBLE STRIP ARRAY DETAIL

SIGN PANEL SIZE (Min)

A	48" x 48"
B	30" x 30"
C	36" x 18"
D	36" x 42"
E	20" x 7"

LEGEND

- TRAFFIC CONE
- TEMPORARY TRAFFIC CONTROL SIGN
- PORTABLE FLASHING BEACON
- FLAGGER
- AUTOMATED FLAGGER ASSISTANCE DEVICE (AFAD)

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM WITH REVERSIBLE CONTROL ON TWO LANE CONVENTIONAL HIGHWAYS

NO SCALE

T13

6-24-22

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TYPICAL RAMP CLOSURES

SIGN PANEL SIZE (Min)

A	48" x 48"
B	48" x 30"
C	36" x 36"
D	48" x 36"

LEGEND

- TRAFFIC CONE
- TEMPORARY TRAFFIC CONTROL SIGN
- BARRICADES
- PORTABLE FLASHING BEACON

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Charles D Suszko
REGISTERED CIVIL ENGINEER

August 1, 2022
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Charles D. Suszko, No. C43029, Exp. 3-31-24, CIVIL, STATE OF CALIFORNIA

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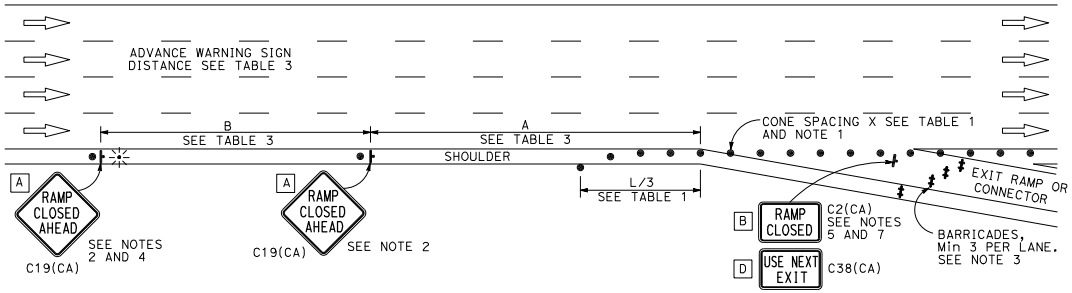
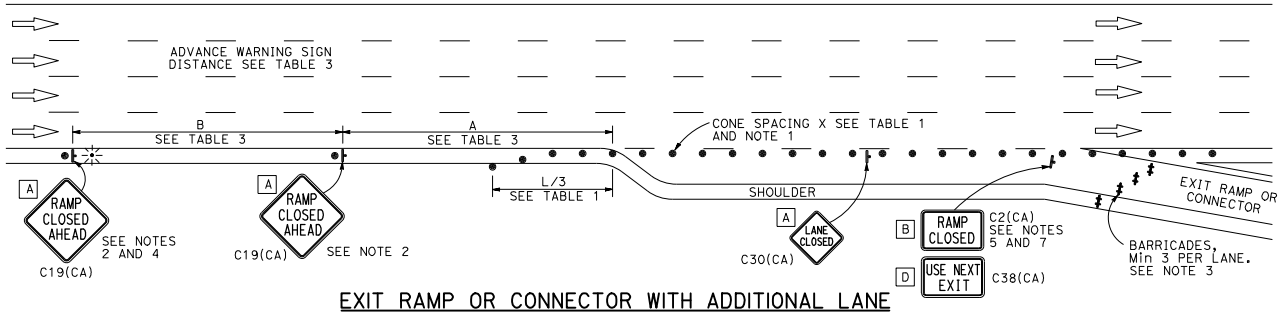
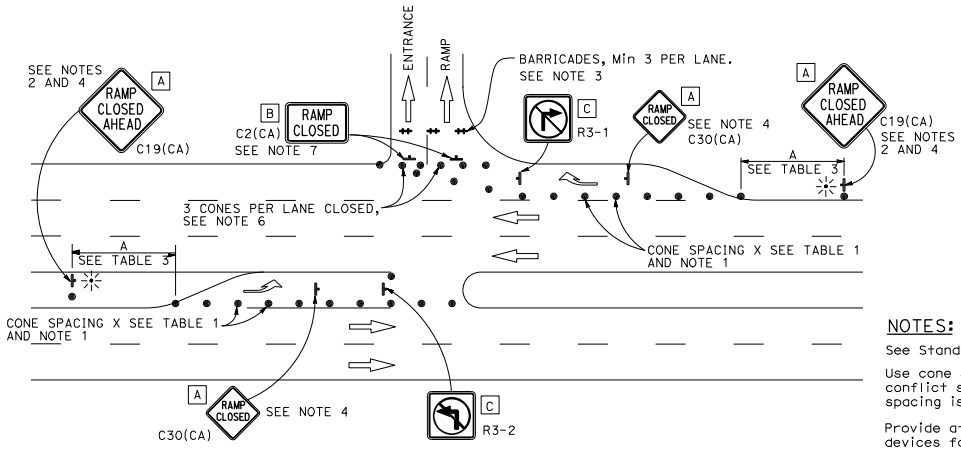


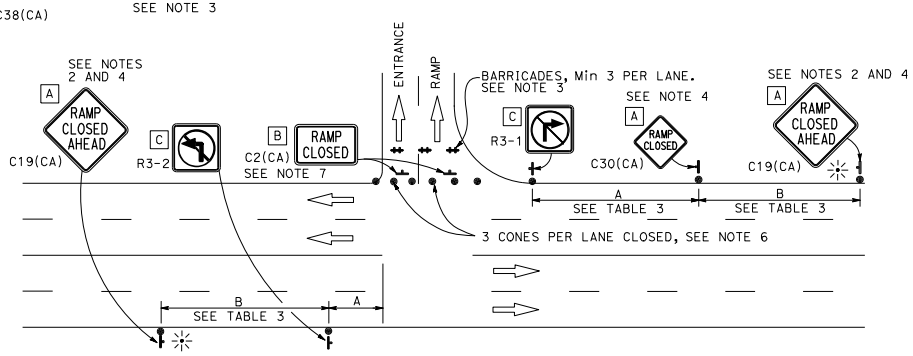
EXIT RAMP OR CONNECTOR



EXIT RAMP OR CONNECTOR WITH ADDITIONAL LANE



ENTRANCE RAMP WITH TURNING POCKETS



ENTRANCE RAMP WITHOUT TURNING POCKETS

NOTES:

1. Portable delineators placed at one-half the spacing indicated for traffic cones may be used instead of cones for daytime closures only.
2. Each advance warning C19(CA) "RAMP CLOSED AHEAD" sign shall be equipped with at least two flags for daytime closure. Each flag shall be at least 16" x 16" in size and shall be orange or fluorescent red-orange in color. A flashing beacon shall be placed on top of the first C19(CA) sign during hours of darkness.
3. Barricades shall be Type I, II or III for closures lastind one week or less and Type III for closures lasting longer than one week.
4. In addition to placing the C19(CA) "RAMP CLOSED AHEAD" and C30(CA) "RAMP CLOSED" signs, black on orange overlay plates with the word "closed" may be mounted. As directed by the Engineer on all guide signs that refer to the closed ramp. The letter size on the overlay shall be the same as the guide sign.
5. The existing "EXIT" signs shall be covered during ramp closures.
6. A minimum of 3 cones shall be placed transversely across each closed lane and shoulder.
7. C2(CA) sign shall be black and white.

NOTES:

See Standard Plan T9 for tables.

Use cone spacing X for taper segment, Y for tangent segment or Z for conflict situations, as appropriate, per Table 1, unless X, Y, or Z cone spacing is shown on this sheet.

Provide at least one person to continuously maintain traffic control devices for lane closures.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR RAMP CLOSURE

NO SCALE

T14

6-24-22

2022 STANDARD PLAN T14

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Charles D Suszko
REGISTERED CIVIL ENGINEER

August 1, 2022
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Charles D. Suszko — No. C43029 — Exp. 3-31-24 — CIVIL — STATE OF CALIFORNIA

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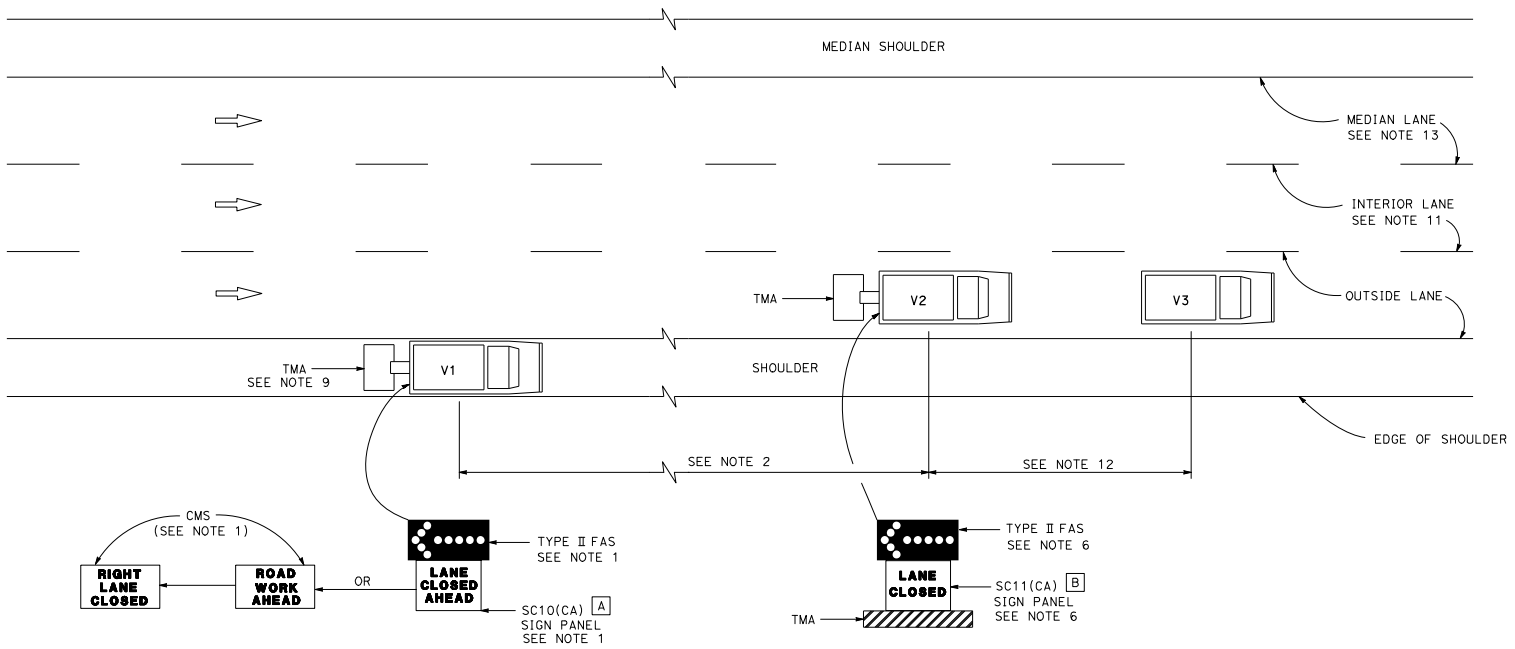

MOVING LANE CLOSURE ON MEDIAN LANE OR OUTSIDE LANE OF MULTILANE HIGHWAYS

SIGN PANEL SIZE (Min)

A 66" x 36"
B 54" x 42"

LEGEND

V1	SIGN VEHICLE
V2	SHADOW VEHICLE
V3	WORK/APPLICATION VEHICLE
	FLASHING ARROW SIGN (FAS)
CMS	CHANGEABLE MESSAGE SIGN
TMA	TRUCK-MOUNTED ATTENUATOR

NOTES:

1. Either a changeable message sign or a SC10(CA) sign panel and a Type II flashing arrow sign shall be mounted on the rear of sign vehicle V1. The changeable message sign shall be sequenced to show the "ROAD WORK AHEAD" message first, followed by the "RIGHT LANE CLOSED" message. For median lane closure, the flashing arrow symbol shall be reversed with the arrowhead on the right and the changeable message sign shall show "LEFT LANE CLOSED".
2. If traffic queues develop, sign vehicle V1 should be positioned upstream from the end of queue. Sign vehicle V1 shall be positioned where highly visible when shoulders are not available.
3. A minimum sight distance of 1500' should be provided in advance of sign vehicle V1.
4. Sign vehicle V1 should remain at the beginning of horizontal or vertical curves until the other vehicles (V2 and V3) are far enough beyond the curve to resume the minimum sight distance of 1500'.
5. Vehicle-mounted sign panels shall have Type III or above retroreflective sheeting, black on white, or black on fluorescent orange, with 6" minimum series D letters per Caltrans sign specifications.
6. Shadow vehicle V2 shall be equipped with a truck-mounted attenuator. The sign panel shown and a Type II flashing arrow sign shall be mounted on the rear of shadow vehicle V2. For median lane closure the flashing arrow sign symbol shall be displayed with the arrowhead on the right.
7. All vehicles used for lane closures shall be equipped with two-way radios, and the vehicle operators shall maintain communication during the work or application operation.
8. All vehicles shall be equipped with flashing or rotating amber lights.
9. If sign vehicle V1 encroaches into the traffic lane due to insufficient shoulder width, sign vehicle V1 shall be equipped with a truck-mounted attenuator. Sign vehicle V1 shall stay as close to the edge of shoulder as practicable.
10. Where workers would be on foot in the work area, a stationary type lane closure (Standard Plan T10, T11, etc., as applicable) shall be used instead of this plan.
11. For moving lane closure on interior lane of multilane highways, use Standard Plan T16.
12. The spacing between work vehicle(s) and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between.
13. When the work/application vehicle V3 occupies the median lane, sign vehicle V1 should drive in the median shoulder and indicate left lane closed ahead.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE ON MULTILANE HIGHWAYS

NO SCALE

T15

6-24-22

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Charles D. Suszko
REGISTERED CIVIL ENGINEER

August 1, 2022
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL CIVIL ENGINEER
Charles D. Suszko
No. C43029
Exp. 3-31-24
CIVIL
STATE OF CALIFORNIA

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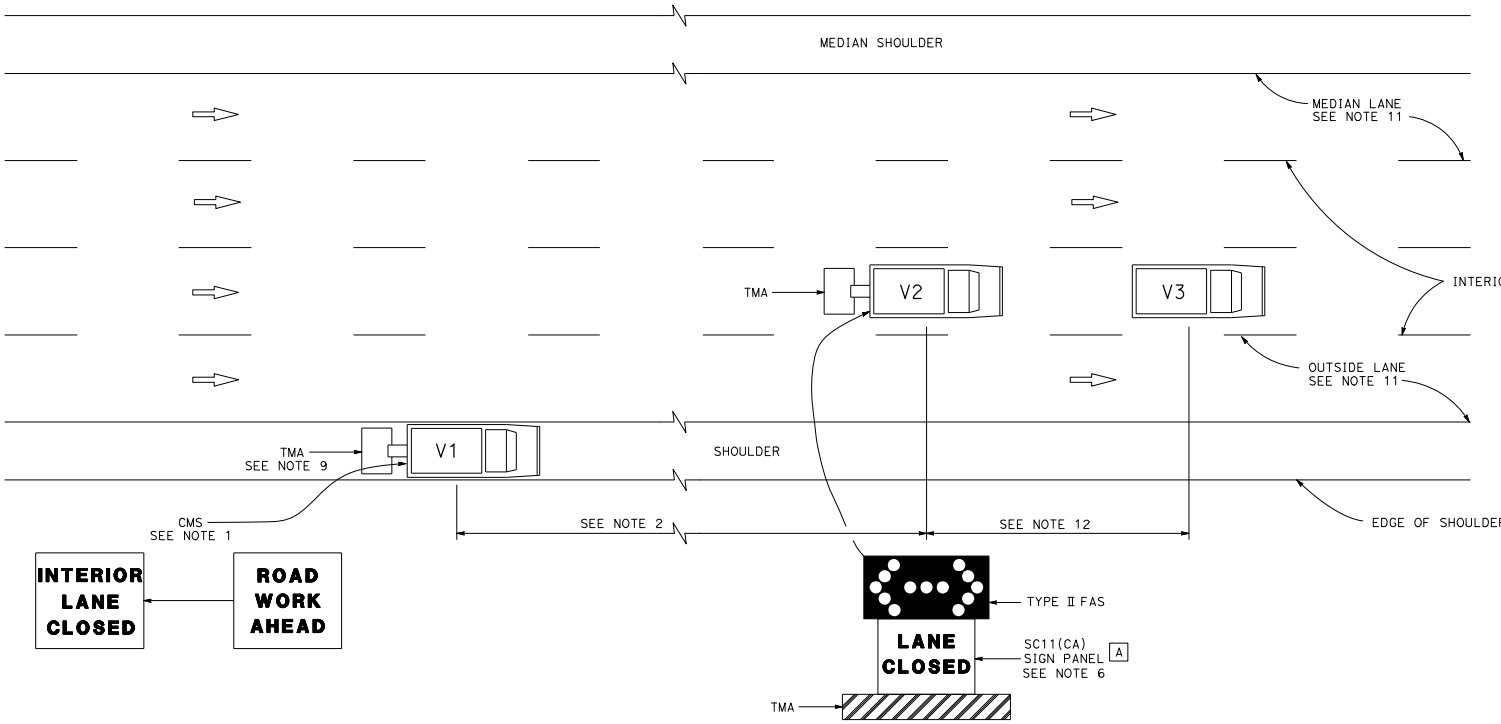

SIGN PANEL SIZE (Min)

A 54" x 42"

LEGEND

V1	SIGN VEHICLE
V2	SHADOW VEHICLE
V3	WORK/APPLICATION VEHICLE
	FLASHING ARROW SIGN (FAS) IN FLASHING DOUBLE ARROW MODE
CMS	CHANGEABLE MESSAGE SIGN
TMA	TRUCK-MOUNTED ATTENUATOR

MOVING LANE CLOSURE ON INTERIOR LANE OF MULTILANE HIGHWAYS

NOTES:

1. A changeable message sign shall be mounted on the rear of sign vehicle V1. The changeable message sign shall be sequenced to show the "ROAD WORK AHEAD" message first, followed by the "INTERIOR LANE CLOSED" message. The message "CENTER LANE CLOSED" may be used in place of the "INTERIOR LANE CLOSED" message.
2. If traffic queues develop, sign vehicle V1 should be positioned upstream from the end of queue. Sign vehicle V1 shall be positioned where highly visible when shoulders are not available.
3. A minimum sight distance of 1500' should be provided in advance of sign vehicle V1.
4. Sign vehicle V1 should remain at the beginning of horizontal or vertical curves until the other vehicles (V2 and V3) are far enough beyond the curve to resume the minimum sight distance of 1500'.
5. Vehicle-mounted sign panels shall have Type III or above retroreflective sheeting, black on white, or black on fluorescent orange, with 6" minimum series D letters per Caltrans sign specifications.
6. Shadow vehicle V2 shall be equipped with a truck-mounted attenuator. The sign panel shown and a Type II flashing arrow sign shall be mounted on the rear of shadow vehicle V2.
7. All vehicles used for lane closures shall be equipped with two-way radios, and the vehicle operators shall maintain communication during the work or application operation.
8. All vehicles shall be equipped with flashing or rotating amber lights.
9. If sign vehicle V1 encroaches into the traffic lane due to insufficient shoulder width, sign vehicle V1 shall be equipped with a truck-mounted attenuator. Sign vehicle V1 shall stay as close to the edge of shoulder as practicable.
10. Where workers would be on foot in the work area, a stationary type lane closure (Standard Plan T10, T11 etc., as applicable) shall be used instead of this plan.
11. For moving lane closure on median lane or outside lane of multilane highways, use Standard Plan T15.
12. The spacing between work vehicle(s) and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE ON MULTILANE HIGHWAYS

NO SCALE

T16

6-24-22

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Charles D Suszko
REGISTERED CIVIL ENGINEER

August 1, 2022
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Charles D. Suszko
No. C43029
Exp. 3-31-24
CIVIL
STATE OF CALIFORNIA

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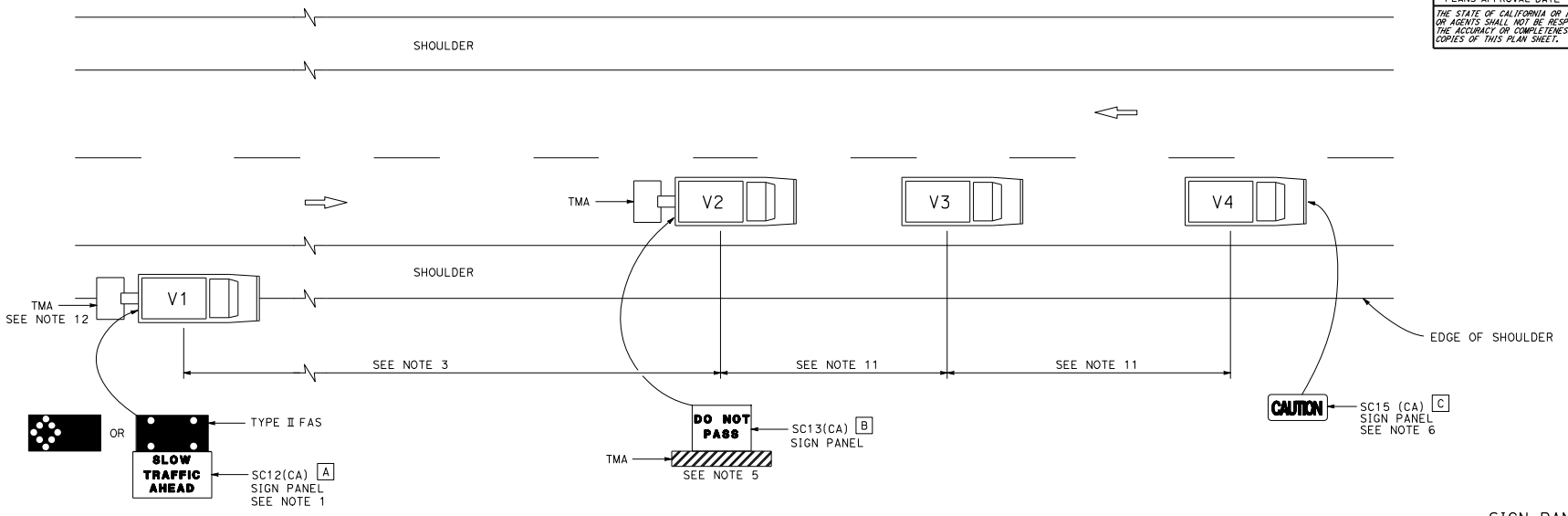

LEGEND

V1	SIGN VEHICLE
V2	SHADOW VEHICLE
V3	WORK/APPLICATION VEHICLE
V4	SIGN VEHICLE
TMA	TRUCK-MOUNTED ATTENUATOR
	FLASHING ARROW SIGN (FAS) IN FLASHING CAUTION MODE
	FLASHING ARROW SIGN (FAS) IN ALTERNATING DIAMOND CAUTION

SIGN PANEL SIZE (Min)

A	72" x 42"
B	54" x 42"
C	54" x 24"

NOTES:

1. Either a changeable message sign or a SC12(CA) "SLOW TRAFFIC AHEAD" sign shall be mounted on the rear of sign vehicle V1. The changeable message sign shall be sequenced to show the "CAUTION" message first, follow by the "SLOW TRAFFIC AHEAD" message. A Type II flashing arrow sign may be used with the SC12(CA) sign panel.
2. Sign vehicle V1 should be positioned where highly visible when shoulders are not available.
3. If traffic queues develop, sign vehicle V1 should be positioned upstream from the end of queue.
4. Vehicle-mounted sign panels shall have Type III or above retroreflective sheeting, black on white, or black on fluorescent orange, with 6" minimum series D letters per Caltrans sign specifications.
5. Shadow vehicle shall be equipped with a truck-mounted attenuator. The sign panel shown shall be mounted on the rear of shadow vehicle V2. The message "LANE CLOSED" may be used in place of the "DO NOT PASS" message.
6. The sign panel shown shall be mounted on the front of sign vehicle V4, facing opposing traffic.
7. All vehicles shall be equipped with flashing or rotating amber lights.
8. Sign vehicle V4 will not be required when the work and vehicles V2 and V3 are 2' or more from the centerline of the highway during the work or application operations.
9. All vehicles used for lane closures shall be equipped with two-way radios and the vehicle operators shall maintain communication during the work or application operation.
10. This plan shall not be used where workers would be on foot in the work area. Use a stationary type lane closure (Standard Plan T13) for this condition.
11. Minimize spacing between vehicles V2 and V3 and vehicles V3 and V4 to deter road users from driving in between them.
12. If sign vehicle V1 encroaches into the traffic lane due to insufficient shoulder width, sign vehicle V1 shall be equipped with a truck-mounted attenuator. Sign vehicle V1 shall stay as close to the edge of shoulder as practicable.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL SYSTEM FOR MOVING LANE CLOSURE ON TWO LANE HIGHWAYS

NO SCALE

T17

6-24-22

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