



*City of San José
Recommended Temporary
Traffic Control Plans*

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Introduction

The Traffic Control Plans and associated text depicted in this Manual conforms with Part 6 of the Manual on Uniform Traffic Control Devices 2014 Edition Revision 3 (MUTCD) and any subsequent revisions thereof.

The criteria of this Manual are intended to primarily apply to urban areas. Urban street traffic is typically characterized by relatively low speeds, wide ranges in traffic volume, narrower roadway lanes, frequent intersections, significant pedestrian traffic, bicyclists and frequent roadside obstacles.

This manual provides the basic standards for the safe movement of traffic upon highways and streets in accordance with Section 21400 of the California Vehicle Code. Traffic control includes safe protection for the public, motorist, cyclist, pedestrian and worker. It is the responsibility of the contractor or organization performing work on, or adjacent to, a roadway to install and maintain such devices which are necessary to provide safe passage for the traveling public through the work area and for the safety of the workers.

This text is intended to supplement the standards established by the Federal Department of Transportation and Caltrans by establishing construction area traffic control guidelines for work within the City of San Jose. The criteria for the position, location, manner of installation, and the use of such signs, lights and devices are furnished solely for the purpose of information and guidance.

No one set of signs or other traffic control devices can typically satisfy all conditions for a given project. At the same time, defining detailed standards that would be adequate to cover all applications is simply not practical. This Manual displays several diagrams that depict common applications of standard temporary traffic control devices and applications. The traffic control selected for each situation shall be based on street type, traffic conditions, duration of operation, physical constraints, and the nearness of the workspace to vehicle traffic, pedestrians, and bicyclists.

Objectives

To Provide:

- a) Safety protection for the public, motorist, cyclist, and pedestrian.
- b) Safety protection for construction workers, contractors, and equipment.
- c) Safe access for police, fire, and rescue vehicles.
- d) Guidance for safe effective work areas, to warn, control, protect, and expedite vehicular and pedestrian traffic.
- e) The basic principles that govern the design and usage of warning signs, lights and devices placed upon the public roadway.

Work Area Planning

Work should be planned in advance to permit employees and equipment to safely move into position, accomplish the job in a safe and skillful manner and move out of the area as soon as possible upon completion.

During any time the normal function of a roadway is suspended, temporary traffic control planning must provide for continuity of function (movement of traffic, pedestrians, bicyclists, transit operations, and access to property/utilities). The location where the normal function of the roadway is suspended is defined as the workspace. The workspace is that portion of the roadway closed to traffic and set aside for workers, equipment, and material. Sometimes there may be several workspaces within the project limits. Each workspace should be signed to inform drivers of what to expect.

Effective temporary traffic control enhances traffic operations and efficiency, regardless of whether street construction, maintenance, utility work, or roadway incidents are taking place in the workspace. Effective temporary traffic control must provide for the workers, road users, and pedestrians. At the same time, it must provide for the efficient completion of whatever activity suspended normal use of the roadway.

It is essential that concern for traffic accidents, worker safety and efficiency of traffic movement form an integral element of every temporary traffic control zone, from planning through completion of work activity. Simultaneously, the control selected must permit efficient maintenance / construction of roadways and roadway appurtenances.

Where physical conditions are such that hills, curves, buildings, vegetation, etc. reduce or obscure driver view, additional precautions become necessary. On-coming traffic should be alerted to potential hazards by the suitable use of signs, flaggers barricades, flags, flashers, or traffic cones, in any combination that will give adequate advance warning and that will channel traffic according to the predetermined plan.

Under conditions of severely restricted visibility, a second "Road Work Ahead" sign, spaced in accordance with the speed/distance table, is advised. Drivers must be able to see warning signs far enough in advance to slow their vehicles to a safe speed.

The employee in charge must review and advise the workers on how to set up, maintain and remove the traffic control devices.

In planning for the safety of all involved, consider the traveling public and remember:

- ◆ They must be warned sufficiently in advance to allow time to think and react.
- ◆ They must have time to regulate their speed, to allow them to pass through the guidance pattern with safety and ensure an even flow of traffic.
- ◆ The need for decision making must be reduced to a minimum. This can be done with a planned guidance pattern.

A checklist of items to be considered in planning should include the following:

- a) Estimated time required to complete the job in order to determine short-term or long-range operations.
- b) Volume and speed of traffic.
- c) Changes in traffic conditions during the operation.
- d) Ordinances and permit requirements.
- e) Set up shall always start with the advance warning sign and work back to the jobsite.
- f) Determination of the number and types of safety devices, cones/delineators, signs, flags, flashers, barricades, flashing arrow signs, etc., required for the job.
- g) Flaggers, while setting up protection and during the job operation, if required.
- h) Effective utilization of utility vehicles for maximum protection.

Warning and Construction Signs, Guards and Barriers

Approved warning signs, barricades, cones/delineators, guards, flags, flares, reflectors, and lights at night, shall be installed and properly maintained wherever hazards exist due to moving or stationary vehicles, open excavations, construction and maintenance operations and similar work.

Warning equipment shall be placed so as to provide adequate notice to motorists, cyclists, or pedestrians that they are approaching an excavation, obstruction, or other hazard. Warning signs shall be removed as soon as the excavation, obstruction, or other hazard is cleared.

Channeling Devices

Channeling devices are elements in a total system of traffic control devices for use in construction and maintenance operations. These elements shall be preceded by a subsystem of warning devices that are adequate in size, number, and placement for the type of roadway on which the work is to take place. Channeling Devices in temporary Traffic Control Zones shall conform to sections 5G.03 and 6F.63 – 6F.73 of the MUTCD 2014 Edition Revision 3 or any subsequent revisions thereof.

Approved channelizing devices shall be used for the following purposes:

- ◆ To channel and divert traffic in advance of work zones.
- ◆ To define traffic lanes through the work zone.
- ◆ To define a change in the position of the lanes around the work zones.
- ◆ To define curves and the edges of the roadway on detours.
- ◆ To separate opposing lanes of traffic.

Correctly positioned cones/delineators provide an excellent guidance path. Improperly positioned cones/delineators only confuse drivers.

Barricades

The function of barricades is to separate the motorist from objects or unusual situations created by construction or maintenance activities in or near the traveled way. Barricades should not be used to guide motorists through the transition or work zones. Barricades in temporary Traffic Control Zones shall conform to sections 6F.68 and 6F.69 of the MUTCD 2014 Edition Revision 3 or any subsequent revisions thereof.

The barricade would not be used where a collision with the barricade would be more severe than a collision with the object being separated. At such locations, cones/delineators, or other less rigid devices should be used.

Barricade design:

Barricades for vehicular traffic shall be of three types: Type I, Type II, and Type III (as shown in MUTCD 2014 Edition Revision 3, Figure 6F-7 or any subsequent revisions thereof)

Markings for barricade rails shall be alternate orange and white stripes sloping downward at an angle of 45 degrees. The entire area of orange and white shall be effectively reflectorized. The predominant color for other barricade components shall be white.

Flashing Arrow Signs (FAS)

Type	Minimum Size	Minimum Number of Panel Elements	Minimum Legibility
A	24" x 48"	12	½ mile
B	30" x 60"	13	¾ mile
C	48" x 96"	15	1 mile

Arrow Panels in temporary Traffic Control Zones shall conform to sections 6F.61 of the MUTCD 2014 Edition Revision 3, or any subsequent revisions thereof.

Night Operations

In order to provide enhanced warning and safety during twilight and night operations, the following steps should be adhered to:

- ◆ When the work area is to be illuminated by use of floodlights, the light placement shall be such that the light beams are not hazardous to oncoming traffic.
- ◆ All warning signs and cones/delineators shall be illuminated or reflectorized.
- ◆ Flashing or rotating amber lights on vehicles may be used for additional work area protection.
- ◆ Flaggers must be illuminated, visible to approaching traffic, and wear approved reflectorized garments.

Note: Flares and red emergency reflectors are strictly for emergency situations and must not be used as substitutes for standard work area warning devices. Flares shall not be used in combustible or high fire areas.

Use of Flaggers

Flaggers shall be provided where approved signs or barricades do not provide adequate traffic control.

The proper use of flaggers, where circumstances warrant, will not only provide for vehicular traffic, but will also provide protection for employees working in the immediate area to divert the normal flow of traffic.

Flaggers are required as follows:

- a) At all locations where warning and control devices cannot adequately control the moving traffic.
- b) Where the job requires the use of one lane for two directions of traffic. (One flagger is required for each direction of traffic.)

More information at: http://www.dot.ca.gov/hq/construc/flagging/flagging_handbook.pdf

Placement and equipment requirements:

Flaggers shall be logically placed in relation to the equipment or operation so as to give adequate warning, and shall be stationed approximately 100 feet (30.5m) ahead of the possible impact point. Flaggers shall wear approved warning garments. Reflectorized vests shall be used when flagging at night and the flaggers must be illuminated and visible to approaching traffic. Flaggers shall be trained in the proper fundamentals of flagging traffic before being assigned as a flagger. Flaggers who are not in visual contact with each other shall use radios or other positive communications.

The temporary sign, C-9A (CA), shall be placed ahead of the flagger. The distance between the sign and the flagger should be based on the average traffic speed, allowing approximately 100 feet for each ten miles per hour.

Flagging procedures and all signs and equipment shall comply with Chapter 6A – 6I of the MUTCD 2014 Edition Revision 3, or any subsequent revisions or updates.

Flagging Procedures for Traffic Control

Flaggers shall use the Stop/Slow paddle for traffic control in the following manner:

To Stop Traffic

Hold the STOP paddle in a stationary position with the arm extended horizontally away from the body. The free arm should be raised with palm facing approaching traffic.

To Alert or Slow Traffic

Hold the SLOW paddle in a stationary position with the arm extended horizontally away from the body. The free arm should be raised and lowered slowly with the palm down.

To Direct Traffic to proceed

Hold SLOW paddle at arm's length and motion with the free hand for traffic to proceed.

Work Area at End of Work Period

Before leaving a work area, it is necessary that approved warning devices be placed to protect motorists and pedestrians.

Ensure that the area is properly barricaded and that flashing lights, where required, are functioning satisfactorily.

Make sure that equipment is secured and that the work area is left orderly.

Make sure that the area and adjacent areas are swept clean and are free of debris.

Pedestrian Considerations

When the work area encroaches upon a sidewalk, walkway, or crosswalk area, adequate protection for the safety of pedestrians must be provided. Pedestrian Considerations in temporary Traffic Control Zones shall conform to Sections 6D and 6F of the MUTCD 2014 Edition Revision 3 or any subsequent revisions thereof. Barricades and cones/delineators may be used advantageously in defining pedestrian walkways. Protect against any condition, which would create a tripping, falling or slipping hazard. A minimum walkway width of 60" must be maintained at all times for safe passage through the work area.

When overhead work is being performed, pedestrian passage area below must be rerouted or protected.

There are three threshold considerations in planning for pedestrians in temporary traffic control zones on highways and streets:

- 1) Pedestrians shall not be led into direct conflicts with work site vehicles, equipment, or operations.
- 2) Pedestrians shall not be led into direct conflicts with mainline traffic moving through or around the work site.
- 3) Pedestrians shall be provided with a convenient travel path that replicates as nearly as possible the most desirable characteristics of sidewalks or footpaths.

In accommodating the needs of pedestrians at work sites, it should always be remembered that the range of pedestrians that can be expected is very wide, including the visually impaired, the hearing impaired, and those with walking disabilities. All pedestrians need protection from potential injury and should be provided a smooth, clearly delineated travel path.

Every effort shall be made to separate pedestrian movement from both work site activity and adjacent traffic. Whenever possible, signing will be used to direct pedestrians to street crossings in advance of an encounter with a temporary traffic control zone. Signs shall be placed at intersections so that pedestrians are not confronted with mid-block work sites that will induce them to skirt the temporary traffic control zone or make a mid-block crossing. It must be recognized that pedestrians will only infrequently retrace their steps to make a crossing. Consequently, ample advance notification of sidewalk closures is critically important. Refer to Figure CSJ-22 of this Manual. See Sections 6D and 6G.05 of the MUTCD 2014 Edition Revision 3, or any subsequent revision thereof, for typical traffic control device usage and techniques for pedestrian movement through work zones.

When pedestrian movement through or around a work site is necessary, the aim of the engineer is to provide a separate, footpath without abrupt changes in grade or terrain. Judicious use of special warning and control devices to warn motorists is helpful for certain difficult work zone situations. These include rumble strips, changeable message signs, hazard identification beacons, flags, and warning lights. Whenever it is feasible, closing off the work site from pedestrian intrusions is preferable to channelizing pedestrian traffic along the site solely with temporary traffic control devices such as cones, portable delineators, barricades, or drums. If the possibility of vehicle impact is very low, chain link or other suitable fencing, placed well away from traffic, is acceptable. Solid fencing with plywood, however, can create sight distance restrictions at intersections and at work site access cuts. Care must be taken not to create fenced areas that are vulnerable to splintering or fragmentation by vehicle impacts. Similarly, temporary traffic control devices used to delineate a temporary traffic control zone pedestrian walkway must be lightweight and, when struck, present a minimum threat to pedestrians,

workers, and impacting vehicles. Only minimally necessary ballasting with lightweight materials should be used with these devices.

Movement by work vehicles and equipment across designated pedestrian paths should be minimized and should be controlled by flaggers. Cuts into work zones across pedestrian walkways should be kept to a minimum, because they often create unacceptable changes in grade and rough or muddy terrain. Pedestrians cannot be expected to traverse these areas willingly. They will tend to avoid the cuts by attempting non-intersection crossings.

At work sites of significant duration, especially in urban areas with high pedestrian volumes, and where falling debris is a concern (such as work on overhead structures), a canopied walkway is frequently needed to protect pedestrians from falling debris. These covered walkways should be sturdily constructed and adequately lit for nighttime use.

In places where pedestrians are judged especially vulnerable to impact by errant vehicles, all foot traffic should be separated and protected by longitudinal barrier systems. Where a barrier is clearly needed, it should have sufficient strength and low deflection characteristics, to keep vehicles from intruding into the pedestrian space. Further, short, non-continuous segments of longitudinal systems, such as concrete barriers, must be avoided because they nullify the containment and redirective capabilities of the design, increase the potential for serious injury to both vehicle occupants and pedestrians, and encourage the presence of blunt, leading ends. All upstream leading ends that are present shall be appropriately flared or protected with properly installed and maintained impact attenuators. With regard to concrete barriers in particular, it is very important to ensure that adjacent segments are properly joined to effect the overall strength required for the system to perform properly.

It has been determined through study and experience that vertical curbs cannot prevent vehicle intrusions into work zones. As a consequence, normal vertical curbing is not a satisfactory substitute for positive barriers when these are clearly needed. Similarly, contractor-constructed wooden railings, chain-link fencing with horizontal pipe runs, and similar systems placed directly adjacent to vehicle traffic are not acceptable substitutes for crashworthy positive barriers. In many instances, temporary positive barriers may be necessary to prevent pedestrians from unauthorized movements into the active work zone and to prevent conflicts with traffic by eliminating the possibility of mid-block crossings.

If a high potential exists for vehicle incursions into the pedestrian space, judgment must be exercised as to whether to reroute pedestrians or use barriers.

Engineering judgment in each temporary traffic control zone situation should readily determine the extent of pedestrian needs. The intent of temporary traffic control zones should provide both a sense of security and safety for pedestrians walking past work sites and consistent, unambiguous channelization to maintain foot traffic along the desired travel paths.

Bicycle Considerations

Whenever possible, maintain bicycle lanes. Provide bicycle warning signs where appropriate. Where a striped bicycle exists, the sign “Bikes Share the Lane” shall be added to the Temporary Traffic Control Signs. Bicycle Considerations in temporary Traffic Control Zones shall conform to Sections 6D.101(CA) and 6G.05 of the MUTCD 2014 Edition Revision 3, or any subsequent revision thereof.

There are several considerations in planning for bicyclists in temporary traffic control zones on highways and streets:

- A travel route that replicates the most desirable characteristics of a wide paved shoulder or bikeway through or around the traffic control zone is desirable for bicyclists.
- If the traffic control zone interrupts the continuity of an existing bikeway system, signs directing bicyclists through or around the zone and back to the bikeway is desirable.
- Unless a separate bike path through or around the traffic control zone is provided, adequate roadway lane width to allow bicyclists and motor vehicles to travel side by side through or around the zone is desirable.
- Bicyclists shall not be led into direct conflicts with mainline traffic, work site vehicles, or equipment moving through or around the traffic control zone.

Special Considerations

All traffic control devices used on street construction, maintenance, utility, or incident management (temporary traffic control) operations shall conform to the applicable specifications of Chapter 6 of the MUTCD 2014 Edition Revision 3, or any subsequent revision thereof.

Special plan preparation and coordination with transit and other highway agencies, police and other emergency units, utilities, schools, railroads, etc. will be needed to receive input and support for advising motorists of potential traffic operation situations.

During temporary traffic control activities, commercial vehicles may need to follow a different route from automobiles because of bridge, weight, clearance, or geometric restrictions. Also, vehicles carrying hazardous materials may need to follow a different route from other vehicles.

TABLE A

MINIMUM RECOMMENDED DELINEATOR AND SIGN PLACEMENT

Table A-1

Taper Length Criteria for Temporary Traffic Control Zones

Type of Taper	Taper Length
<u>Upstream Tapers</u>	
Merging Taper	L MINIMUM
Shifting Taper	1/2 L Minimum
Shoulder Taper	1/3 L Minimum
Two-Way Traffic Taper	100 feet Maximum
<u>Downstream Tapers</u>	
(Use is optional)	100 feet Minimum

Formula for Taper Length 'L'

$L = \frac{WS^2}{60}$ (40 mph or less)	$L = WS$ (45 mph or greater)
<p>L = Taper Length in feet W = Width of Offset in feet S = Speed in mph</p>	

Table A-2

Suggested Advance Warning Sign Spacing

Road Type	Distance Between Signs in Feet
	S
Urban - 25 mph or less	200
Urban - 30 mph or more	350
Rural	500
Expressway/Freeway	1000

Table A-3

Taper Length and Buffer Space
 Use in Typical Applications Diagrams

Length of Taper 'L' in Feet			Longitudinal Buffer Space	
Speed in Miles per Hour*	Width of Offset**		Speed in Miles per Hour*	Length of Buffer Space in Feet
	11 Feet	12 Feet		
20	73	80	20	35
25	115	125	25	55
30	165	180	30	85
35	225	245	35	120
40	293	320	40	170
45	495	540	45	220
50	550	600	50	280
55	605	660	55	335
60	660	720	60	415
65	715	780	65	485
70	770	840	70	585

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

** For other offset widths, apply the formula in table A-1.