NORTH REGION CONSTRUCTION

NIGHT WORK GUIDE

JANUARY 2007

VERSION NOTE

This is the 1st update of the 2006 NRC Night Work Guide. It reflects the standards of the new California Manual of Uniform Traffic Control Devices (CA MUTCD) and the new May 2006 version of the Standard Specifications.

This guide was written by Ed Yarbrough, North Region Construction Safety Coordinator, for use by Caltrans and contractor field staff as an informal reference for discussion of methodologies to work safer during night time hours. It also incorporates some of the continuing lessons learned from observations of night work operations.

DISCLAIMER

The information provided in this guide from various Caltrans manuals, the California Manual of Uniform Traffic Control Devices (CA MUTCD), Cal-OSHA Title 8 regulations, and various California Codes was accurate of January 2, 2007. Although this document will periodically be updated, if a question arises concerning the content of this document, the user should refer to the respective website for each of the referenced documents to retrieve the most up-to-date information for that respective issue.

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BACKGROUND

Night work. The most difficult and challenging time for the contractor to work to meet his contractual obligations and therefore the most difficult time for the inspector to ensure the work meets the standards and levels of quality that Caltrans ascribes to while also ensuring that everything is done safely.

Most of the challenges are readily apparent your first night on the job. Its dark outside and lighting the work area is the biggest challenge. Placing and maintaining traffic control requires additional work on the contractor's part. Although traffic volumes are often lower, traffic speeds are often higher. Factor in other issues that affect drivers such as reduced visibility and impaired drivers and you have a challenging mix of issues affecting the public as they travel through your work zone.

All these factors make it imperative that the inspector take the extra time necessary to ensure his or her own personal safety, the safety of the traveling public and the safety of the contractor's personnel. This guide will provide you all the basic information you need to know to do this right and will also provide you all the necessary references in one easy to use package.

DEFINITION OF "DARKNESS"

According to the California Vehicle Code (CVC), Definitions, 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.

CONTRACTOR INJURY ILLNESS PREVENTION PROGRAM (IIPP) AND CODE OF SAFE PRACTICES (COSP)

The first item you should review on any project with night work is the contractor IIPP. It should address what Personal Protective Equipment (PPE) the contractor will require staff to wear. Additionally, Cal OSHA considers night work to be a unique enough condition such that it requires a dedicated COSP to address how the contractor will ensure the safety of his personnel.

PPE

THE BASICS

The MUTCD states that a responsible person must decide what the PPE requirements are and that high visibility safety apparel have an ANSI 107-99 label in it. For Caltrans personnel, our Safety Manual dictates policy. For the contractor, their IIPP will dictate.

The current standard being applied is ANSI 107-99 and it is broken down into three distinct classes, which are based on the amount of retroreflective material included in the vest or ensemble:

- Class I – a vest only, normally with two vertical retroreflective stripes on either side of the shoulder that goes up the front and down the back of the vest.

- Class II – a vest only, normally with the same two vertical retroreflective stripes and adds a horizontal stripe around the torso normally near the waistline. (This is the current standard for everyone for night work!)

- Class III – this is normally an ensemble that includes a Class II vest and pants with retroreflective stripes around the leg below the knee. Other Class III garments include jackets and short sleeved shirt vests (which can be worn over another shirt) with retroreflective striping on the sleeves.

Whatever garment you or the contractor chooses to wear, it should be clean and in good condition and per CSO 1598 the retroreflective material shall be visible at a minimum of 1000 feet. If you note anyone with a garment in poor condition that does not meet this standard, ask them to replace the garment immediately.

CALTRANS PERSONNEL

The requirements/options are:

- The new ANSI 107-99 Class III ensemble of the green Class II vest and green pants is the new standard.
- White coveralls are still an option, but not in foggy or snow conditions.
- Safety glasses are mandatory.
- The Caltrans rain jacket may be worn in lieu of the vest and should be worn in place of white clothing in either foggy or snow conditions.

CONTRACTOR PERSONNEL

This will be discussed as part of the Pre-Job checklist. At the minimum, all contractor personnel must wear a Class II reflectorized vest with a horizontal stripe around the torso per CSO 1598 (for all personnel) and CSO 1599 (for flaggers).

NIGHT WORK BASICS

LIGHTING

The key issue facing you at night will be ensuring that the contractor provides sufficient light for the work areas. The current requirement per CSO 1523 is 10 foot candles, which will normally be achieved with light plants or balloon lights. For reference, a street luminaire or vehicle headlights on a low beam setting provide only 2-4 foot candles.

The bottom line for lighting is simple, the contractor will provide lighting for all operations, no exceptions are to be made. Any contractor personnel working outside the lights will be directed to return to a lighted area or the operation shall be stopped.

Lighting small mobile operations is the biggest challenge faced by the contractor and it is the contractors responsibility to make a good faith effort to meet the CSO requirements. Each of the cases below will require the contractor to make additional effort to ensure the safety of their personnel. These operations include:

- Sawcutting with a following sweeper
- Gradesetter
- Striping layout
- AC dump man
- Digout operations, where ground personnel come in behind the grinder to clean up the digout

CONTRACTOR WORK VEHICLES AND EQUIPMENT

A secondary issue not currently formally covered under any Caltrans specifications deals with contractor work vehicles. At times, the contractor may hire personnel using their personal vehicles to complete tasks for the contractor and this vehicle will probably not have any signage or additional safety lighting (such as a rotating beacon). However, having a vehicle with no other identification or safety lighting traveling through your lane closure has a potential to confuse the public such that someone may choose to "follow the leader" and jump into your closure to get around a vehicle because they saw an unmarked vehicle traveling through the closure. If this situation occurs on your job, you should ask that the contractor ensure that all work vehicles have a rotating beacon on them.

All contractor work vehicles, this includes heavy equipment, backhoes, trenching machines, etc. are required by the CSO's are required to have two working headlights and taillights, respectively. Vehicles without appropriate lighting should be kept from working until they are brought into CSO compliance.

All work vehicles subject to registration (i.e. 10 wheel dumps or tractor trailers) are required to have at least a single white back up light per CVC 24606. This is especially important for backing operations for 10 wheel dump trucks.

CSO 1592, Warning Methods, mandates a signaler be used for backing operations where there are high ambient noise or congested conditions. Due to limited visibility at night, a signaler should be mandated for all backing operations.

Any stockpiles or contractor equipment parked in the 15 foot construction area clear recovery zone in an area outside the active lighted work zone should be delineated with cones. Where possible, ensure stockpiles or contractor equipment is parked outside the construction clear recovery zone.

MAINTAINING TRAFFIC SSP

The Maintaining Traffic SSP has a standard requirement that no contractor personal vehicles be parked within the State right-of-way. This needs to be rigidly enforced at night to ensure the public is not confused by private vehicles parked and/or moving in and out of the work zone.

TRAFFIC CONTROL AND FLAGGERS

Getting this right takes effort from the contractor, there are more items that need to be addressed here than in any other inspectable task that will normally go on at night.

The following list of items should all be routinely checked as part of traffic control:

- Flagger stations – shall be illuminated and shall be visible from 1000 feet. If slow flaggers are to be used, remind them that they must stay in the lighted area, they cannot walk with the end of queue as they would during a daylight operation.

- Glare – you will need to drive through the work zone in both directions looking at the light plants and the potential for glare affecting driver vision. PCMS boards need to be dimmed appropriately to reduce this condition.

- PCMS – These are one of your most important tools for a night work and there are a series of items you need to check to ensure they are being used properly:

    - Ensure you drive through the work zone at highway speeds and that you can read all the messages on the board.
    - Ensure the board is angled for maximum visibility and is set at the appropriate height (1.5 m above OG for rural areas, 2.1 m above OG for urban areas).
    - If the board is to be left in place after the shift is complete, ensure it is turned off and the message face is turned 90 degrees, such that it is aligned parallel to traffic flow.
    - Check the board for legibility, the minimum distance that you should be able to read the message from is 750 feet and the PCMS board should have a corresponding letter height of approximately 18 inches to meet this requirement.
    - Per the CA MUTCD, if the PCMS board is within 15 feet of the edge of traveled way it is to be delineated with a 9 cone taper set at a spacing of 25 feet apart.

- Lane shifts - Ensure that the lane shifts/drop tapers are set at the appropriate length. It is important that drivers have time to make the lane change.

- Signs - All signs, both permanent and temporary shall conform to the Standard Plans and Specifications and SSP requirements. They must be retroreflective (this means a retroreflective background). Paper signs with retroreflective lettering are not legal and should immediately be removed from the job site.

- Road work ahead rag sign – must have a flashing beacon with 12 inch lens installed. Check this periodically during the shift to ensure it is still flashing at an appropriate rate.

- Cones/Channelizers/Delineators – ensure they are in good condition, per the ATSSA “Quality Standards for Work Zone Traffic Control Devices” reference and that they each have appropriate retroreflective material installed.

The following items are for more specialized situations that require additional focus by the inspector (please refer to the appropriate Standard Plan for quick reference in the field):

- If you have a ramp closure, ensure that you have three barricades installed per lane on the ramp and that the cone set on the mainline is continued to a point past the end of the paved gore area, ensuring that any point where traffic is jumping the ramp late is covered by cones.

- If your lane closure allows people to use an existing exit ramp, ensure that a G84 Exit sign is placed in the gore area.

OTHER SAFETY CONSIDERATIONS

There are other items that you may consider to enhance the safety of your nighttime traffic control zone:

- If you are having issues with rear end collisions at the lane shift/drop or with traffic continually knocking over the cones on the lane drop consider using traffic drums in lieu of cones, especially in high-speed environments. Traffic drums have a higher profile, are more visible, and the public is more reluctant to run into a traffic drum versus a cone. If you choose to use traffic drums, use them for the length of the lane drop, preferably continue them for the first two spots once the lane is closed, then switch back to cones.

PRE-JOB CONFERENCE

It is essential that you thoroughly discuss night work expectations at the pre-job conference with the contractor. Establishing expectations from the very beginning of the job will make it easier to enforce the contract requirements when work is actively taking place. The Pre-Job Safety Checklist used in North Region has a number of night work specific items to help guide your discussions on night work expectations.

TOOLS FOR ENFORCEMENT

One of the biggest challenges facing any inspector in the field is what tools does he/she have to ensure night work is done safely. The Appendices to this document list a number of contract and Cal OSHA references that will apply to project safety and many of these are night work specific.

Remember, the Standard Specifications (SS) require that the contractor comply with all Cal OSHA rules/regulations and that they light their work areas at night (see SS 7-1.06) and you need safe access to the work to do your inspection (see SS 5-1.08) and not having a lighted work area is violation of the specification. These, coupled with specific references to the CA MUTCD or the Cal OSHA Title 8 regulations will be you basic references to ensure contractor compliance with safety regulations.

If, as happens from time-to-time, you have a subcontractor working by themselves at night and you have issues, check your project files to see who has responsibility for superintendence and if necessary invoke SS 5-1.06, Superintendence, and call out the prime contractor superintendent to fix the problem.

SUMMARY

Night work presents a specialized set of safety issues that the contractor will need to address to ensure the safety of you, the inspector, his personnel, and the traveling public. Caltrans staff has the responsibility to enforce the contract requirements to ensure their own safety, the safety of the traveling public, and the safety of the contractor personnel. Failure to do so may expose Caltrans to potential violations of Cal OSHA requirements (with specific concern of Multi Employer liability issues) or tort liability issues.

APPENDIX A

REFERENCES WEB PAGE LISTING

California Vehicle Code:
http://www.leginfo.ca.gov/calaw.html

Cal OSHA Title 8
http://www.dir.ca.gov/samples/search/query.htm

California MUTCD
http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/

APPENDIX B

CALIFORNIA VEHICLE CODE

Division 1, Words and Phrases Defined; Section 280

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.

Division 12, Equipment of Vehicles; Chapter 2, Lighting; Article 3, Rear Lighting Equipment; Section 24606

24606. (a) Every motor vehicle, other than a motorcycle, of a type subject to registration and manufactured on and after January 1, 1969, shall be equipped with one or more backup lamps either separately or in combination with another lamp. Any vehicle may be equipped with backup lamps.

(b) Backup lamps shall be so directed as to project a white light illuminating the highway to the rear of the vehicle for a distance not to exceed 75 feet. A backup lamp may project incidental red, amber, or white light through reflectors or lenses that are adjacent or close to, or a part of, the lamp assembly.

(c) Backup lamps shall not be lighted except when the vehicle is about to be or is backing or except in conjunction with a lighting system which activates the lights for a temporary period after the ignition system is turned off.

(d) Any motor vehicle may be equipped with a lamp emitting white light on each side near or on the rear of the vehicle which is designed to provide supplemental illumination in an area to the side and rear not lighted by the backup lamps. These lamps shall be lighted only with the backup lamps.

APPENDIX C

CALIFORNIA MUTCD

INTRODUCTION

Standard:
The California MUTCD is hereby adopted as, and shall be the standard for all official traffic control devices, under Section 11340.9(h) of California Government Code and Section 21400 of California Vehicle Code.

Support:
Department of Transportation publishes Standard Specifications, Standard Special Provisions, Standard Plans and other manuals, which contain specifications and requirements for traffic control devices, including their use and placement, when performing work on State highways. In some cases those specifications and requirements can vary from, and be more stringent than those shown in the California MUTCD.

Standard:
Whenever there is a discrepancy between the specifications and requirements contained in the California MUTCD, and those contained in the publications noted in the previous paragraph for work on State highways, those publications shall govern.
On State highways the California MUTCD shall mean to include the Department of Transportation's Standard Plans, Standard Specifications and Standard Special Provisions publications.
Nothing contained in the California MUTCD shall prevent the Department of Transportation from modifying, changing, or adopting new specifications deemed necessary.
Whenever there is a discrepancy between the specifications and requirements incorporated from FHWA's MUTCD and the California MUTCD amendments, the California MUTCD amendments shall govern.

Standard:
When used in this Manual, the text headings shall be defined as follows:
1. Standard—a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. All standards are labeled, and the text appears in bold type. The verb shall is typically used. Standards are sometimes modified by Options.
2. Guidance—a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering

study indicates the deviation to be appropriate. All Guidance statements are labeled, and the text appears in unbold type. The verb should is typically used. Guidance statements are sometimes modified by Options.
3. Option—a statement of practice that is a permissive condition and carries no requirement or recommendation. Options may contain allowable modifications to a Standard or Guidance. All Option statements are labeled, and the text appears in unbold type. The verb may is typically used.
4. Support—an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. Support statements are labeled, and the text appears in unbold type. The verbs shall, should, and may are not used in Support statements.
For all purposes, regardless of the text heading, any sentence containing the verb shall or MUTCD text edited to the verb shall, shall be considered a Standard. Similarly, any sentence containing the verb should or MUTCD text edited to the verb should, shall be considered a Guidance and any sentence containing the verb may or MUTCD text edited to the verb may, shall be considered an Option.

Chapter 6B – Fundamental Principles

Section 6B.01 Fundamental Principles of Temporary Traffic Control
Standard:
Before any new detour or temporary route is opened to traffic, all necessary signs shall be in place. All TTC devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, TTC devices that are no longer appropriate shall be removed or covered.

Chapter 6D – Pedestrian and Worker Safety

Section 6D.03 Worker Safety Considerations
Guidance:

B. Worker Safety Apparel—all workers exposed to the risks of moving roadway traffic or construction equipment should wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Safety Apparel" (see Section 1A.11), or equivalent revisions, and labeled as ANSI 107-1999 standard performance for Class 1, 2, or 3 risk exposure. A competent person designated by the employer to be responsible for the worker safety plan within the activity area of the job site should make the selection of the appropriate class of garment. Refer to Construction Safety Order in the California Code of Regulations (Title 8, Division 1, Chapter 4, Subchapter 4, Article 3, Section 1523 - Illumination).

Chapter 6E – Flagger Control

Section 6E.02 High-Visibility Safety Apparel
Standard:
For daytime and nighttime activity, flaggers shall wear safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel" (see Section 1A.11) and labeled as meeting the ANSI 107-1999 standard performance for Class 2 risk exposure. The apparel background (outer) material color shall be either fluorescent orange-red or fluorescent yellow-green as defined in the standard. The retroreflective material shall be either orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 300 m (1,000 ft). The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.

Standard: The retroreflective clothing, or the retroreflective material added to the clothing, shall have a minimum of one horizontal stripe around the torso.

Option: White outer garments with retroreflective material may be worn during hours of darkness in lieu of colored vests, jackets and/or shirts.

Section 6E.05 Flagger Stations
Standard:
Except in emergency situations, flagger stations shall be preceded by an advance warning sign or signs. Except in emergency situations, flagger stations shall be illuminated at night.

Chapter 6F – Temporary Traffic Control Zone Devices

Section 6F.04 Sign Maintenance
Standard:
Signs shall be properly maintained for cleanliness, visibility, and correct positioning.
Signs that have lost significant legibility shall be promptly replaced.

Section 6F.55 Portable Changeable Message Signs
Standard:
On State highways, the message displayed on Portable Changeable Message signs shall be visible from a distance of 460 m (1500 ft) and shall be legible from a distance of 230 m (750 ft), at noon on a cloudless day, by persons with vision of or corrected to 20/20.

Section 6F.56 Arrow Panels

Panel Type	Minimum Size	Minimum Legibility Distance	Minimum Number of Elements
A	1200 x 600 mm (48 x 24 in)	0.8 km (1/2 mi)	12
B or II**	~~1500 x 750 mm (60 x 30 in)~~ 1800 x 900 mm (72 x 36 in)	1.2 km (3/4 mi)	13
C or I**	2400 x 1200 mm (96 x 48 in)	1.6 km (1 mi)	15
D	None*	0.8 km (1/2 mi)	12

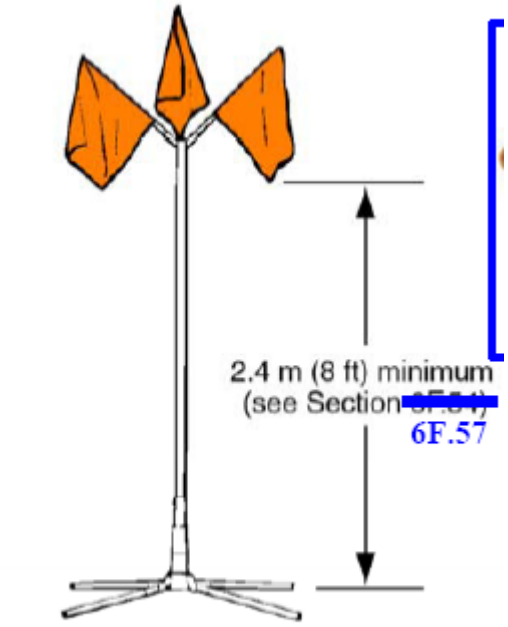
*Length of arrow equals 1200 mm (48 in), width of arrowhead equals 600 mm (24 in)

Standard:
* - For State highways, the panel type B shall mean type II and the panel type C shall mean type I.
* - For State highways, the panel type B (or type II) shall have a minimum size of 1800 x 900 mm (72 x 36 in).

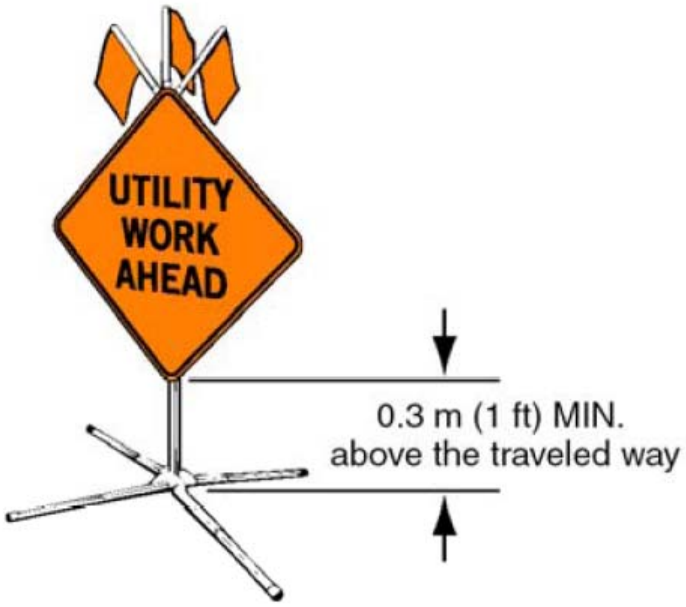
Section 6F.57 High-Level Warning Devices (Flag Trees)
Standard: A high-level warning device shall consist of a minimum of two flags with or without a Type B high-intensity flashing warning light. The distance from the roadway to the bottom of the lens of the light and to the lowest point of the flag material shall be not less than 2.4 m (8 ft). The flag shall be 400 mm (16 in) square or larger and shall be orange or fluorescent red-orange in color.

Section 6F.59 Cones, Section 6F.60 Tubular Markers, Section 6F.62 Drums
Standard: On State highways, the retroreflectorized bands shall be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

Section 6F.77 Flashing Warning Beacons
Standard: The beacon lens shall have a visible diameter of 300 mm (12 in) and shall conform to Department of Transportation's standards for signal lenses, and the lighting unit shall have a visor and back plate or other suitable means of providing adequate contrast. The mounting height shall be between 1.8 m (6 ft) and 3 m (10 ft), measured from the bottom of the base to the center of the lens.



High-Level Warning Device
(Flag Tree)



APPENDIX D

2006 STANDARD SPECIFICATIONS

5-1.06 SUPERINTENDENCE

- The Contractor shall designate in writing before starting work, an authorized representative who shall have the authority to represent and act for the Contractor.
- When the Contractor is comprised of 2 or more persons, firms, partnerships or corporations functioning on a joint venture basis, the Contractor shall designate in writing before starting work, the name of one authorized representative who shall have the authority to represent and act for the Contractor.
- The authorized representative shall be present at the site of the work at all times while work is actually in progress on the contract. When work is not in progress and during periods when work is suspended, arrangements acceptable to the Engineer shall be made for any emergency work which may be required.
- Whenever the Contractor or the Contractor's authorized representative is not present on any particular part of the work where it may be desired to give direction, orders will be given by the Engineer, which shall be received and obeyed by the superintendent or foreman who may have charge of the particular work in reference to which the orders are given.
- Any order given by the Engineer, not otherwise required by the specifications to be in writing, will on request of the Contractor, be given or confirmed by the Engineer in writing.

5-1.08 INSPECTION

The Engineer shall, at all times, have safe access to the work during its construction, and shall be furnished with every reasonable facility for ascertaining that the materials and the workmanship are in accordance with the requirements and intentions of these specifications, the special provisions and the plans. All work done and all materials furnished shall be subject to the Engineer's inspection.

5-1.12 CHARACTER OF WORKERS

If any subcontractor or person employed by the Contractor shall appear to the Engineer to be incompetent or to act in a disorderly or improper manner, they shall be discharged immediately on the request of the Engineer, and that person shall not again be employed on the work.

7-1.01 LAWS TO BE OBSERVED

The Contractor shall keep fully informed of all existing and future State and Federal laws and county and municipal ordinances and regulations which in any manner affect those engaged or employed in the work, or the materials used in the work, or which in any way affect the conduct of the work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. The Contractor shall at all times observe and comply with, and shall cause all the Contractor's agents and employees to observe and comply with all existing and future laws, ordinances, regulations, orders and decrees of bodies or tribunals having any jurisdiction or authority over the work; and shall protect and indemnify the State of California, and all officers and employees thereof connected with the work, including but not limited to the Director and the Engineer, against any claim or liability arising from or based on the violation of any law, ordinance, regulation, order or decree, whether by the Contractor or the Contractor's employees. If any discrepancy or inconsistency is discovered in the plans, drawings, specifications or contract for the work in relation to any law, ordinance, regulation, order or decree, the Contractor shall forthwith report the same to the Engineer in writing.

7-1.06 SAFETY AND HEALTH PROVISIONS

- The Contractor shall conform to all applicable occupational safety and health standards, rules, regulations and orders established by the State of California.
- Working areas utilized by the Contractor to perform work during the hours of darkness, shall be lighted to conform to the minimum illumination intensities established by California Division of Occupational Safety and Health Construction Safety Orders.
- All lighting fixtures shall be mounted and directed in a manner precluding glare to approaching traffic.

7-1.08 PUBLIC CONVENIENCE

- In order to expedite the passage of public traffic through or around the work and where ordered by the Engineer, the Contractor shall install signs, lights, flares, temporary railing (Type K), barricades and other facilities for the sole convenience and direction of public traffic. Also where directed by the Engineer, the Contractor shall furnish competent flaggers whose sole duties shall consist of directing the movement of public traffic through or around the work. The cost of furnishing and installing the signs, lights, flares, temporary railing (Type K), barricades, and other facilities, not to be paid for as separate contract items, will be paid for as extra work as provided in Section 4-1.03D.

7-1.09 PUBLIC SAFETY

- Whenever the Contractor's operations create a condition hazardous to traffic or to the public, the Contractor shall, at the Contractor's expense and without cost to the State, furnish, erect and maintain those fences, temporary railing (Type K), barricades, lights, signs and other devices and take such other protective measures that are necessary to prevent accidents or damage or injury to the public.
- Fences, temporary railing (Type K), barricades, lights, signs, and other devices furnished, erected and maintained by the Contractor, at the Contractor's expense, are in addition to any construction area traffic control devices for which payment is provided for elsewhere in the specifications.
- The Contractor shall also furnish such flaggers as are necessary to give adequate warning to traffic or to the public of any dangerous conditions to be encountered, and payment therefor will be made as provided in Section 12-2.02, "Flagging Costs."
- Signs, lights, flags, and other warning and safety devices and their use shall conform to the requirements set forth in Part 6 of the MUTCD and of the MUTCD California Supplement. Signs or other protective devices furnished and erected by the Contractor, at the Contractor's expense, as above provided, shall not obscure the visibility of, nor conflict in intent, meaning and function of either existing signs, lights and traffic control devices or any construction area signs and traffic control devices for which furnishing of, or payment for, is provided elsewhere in the specifications. Signs furnished and erected by the Contractor, at the Contractor's expense, shall be approved by the Engineer as to size, wording and location.
- Should the Contractor appear to be neglectful or negligent in furnishing warning devices and taking protective measures as above provided, the Engineer may direct attention to the existence of a hazard and the necessary warning devices shall be furnished and installed and protective measures taken by the Contractor at the Contractor's expense.

12-1.01 DESCRIPTION

- Attention is directed to Part 6 of the MUTCD and of the MUTCD California Supplement. Nothing in this Section 12 is to be construed as to reduce the minimum standards in these manuals.

12-2.01 FLAGGERS

- Flaggers while on duty and assigned to traffic control or to give warning to the public that the highway is under construction and of any dangerous conditions to be encountered as a result thereof, shall perform their duties and shall be provided with the necessary equipment in conformance with Part 6 of the MUTCD and of the MUTCD California Supplement. The equipment shall be furnished and kept clean and in good repair by the Contractor at the Contractor's expense.

12-3.03 FLASHING ARROW SIGNS

- Flashing arrow signs shall conform to the following legibility requirements. The minimum legibility distance is the distance at which flashing arrow signs shall be legible at noon on a cloudless day and at night by persons with vision of or corrected to 20/20.

Type	Minimum Size	Minimum Number of Panel Lights	Minimum Legibility Distance
I	48″ X 96″	15	One Mile
II	36″ X 72″	13	0.75 mile

12-3.12 PORTABLE CHANGEABLE MESSAGE SIGNS

The message displayed on the sign shall be visible from a distance of 1,500 feet and shall be legible from a distance of 750 feet, at noon on a cloudless day, by persons with vision of or corrected to 20/20. The sign panel shall be 3-line matrix and shall display not less than 7 characters per line. Sign messages to be displayed shall be as approved by the Engineer.

APPENDIX E

GENERAL INDUSTRY AND CONSTRUCTION SAFETY ORDERS

General Industry Safety Orders

§3203. Injury and Illness Prevention Program.

(b) Records of the steps taken to implement and maintain the Program shall include:

(1) Records of scheduled and periodic inspections required by subsection (a)(4) to identify unsafe conditions and work practices, including person(s) conducting the inspection, the unsafe conditions and work practices that have been identified and action taken to correct the identified unsafe conditions and work practices. These records shall be maintained for at least one (1) year; and EXCEPTION: Employers with fewer than 10 employees may elect to maintain the inspection records only until the hazard is corrected.

(2) Documentation of safety and health training required by subsection (a)(7) for each employee, including employee name or other identifier, training dates, type(s) of training, and training providers. This documentation shall be maintained for at least one (1) year.

Construction Safety Orders

§1509. Injury and Illness Prevention Program.

(a) Every employer shall establish, implement and maintain an effective Injury and Illness Prevention Program in accordance with section 3203 of the General Industry Safety Orders.

(b) Every employer shall adopt a written Code of Safe Practices which relates to the employer's operations. The Code shall contain language equivalent to the relevant parts of Plate A-3 of the Appendix.

(c) The Code of Safe Practices shall be posted at a conspicuous location at each job site office or be provided to each supervisory employee who shall have it readily available.

§1511. General Safety Precautions.

(a) No worker shall be required or knowingly permitted to work in an unsafe place, unless for the purpose of making it safe and then only after proper precautions have been taken to protect the employee while doing such work.
(b) Prior to the presence of its employees, the employer shall make a thorough survey of the conditions of the site to determine, so far as practicable, the predictable hazards to employees and the kind and extent of safeguards necessary to prosecute the work in a safe manner in accordance with the relevant parts of Plate A-2-a and b of the Appendix.

§1523. Illumination.

(a) Construction areas, ramps, corridors, offices, shops and storage areas, etc., shall be lighted to not less than the minimum illumination intensities in the following Table while work is in progress.
Minimum Illumination Intensities In Foot-Candles

Minimum Illumination Intensities In Foot-Candles

Foot-Candles	*Area or Operation*
3	General construction area lighting low activity.
5	Outdoor active construction areas, concrete placement, excavation and waste areas, accessways, active storage areas, loading platforms, refueling, and field maintenance areas.
5	Indoors: warehouses, corridors, hallways, stairways, and exit-ways.
10	General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active storerooms, barracks or living quarters, locker or dressing rooms, mess halls and indoor toilets and workrooms).
10	Nighttime highway construction work.
30	First-aid stations, infirmaries, and offices.

(b) Nighttime highway construction work lighting shall be provided within the work zone to illuminate the task(s) in a manner that will minimize glare to work crews and not interfere with the vision of oncoming motorists (e.g. providing screens, mounting lamps below the top edge of the barrier wall, varying the beam angle, etc.)

§1591. Haulage Vehicles, Equipment-Construction and Maintenance.

(g) Lights. Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two headlights and two taillights in operable condition.

§1592. Warning Methods.

(a) Every vehicle with a haulage capacity of 2 1/2 cubic yards or more used to haul dirt, rock, concrete, or other construction material shall be equipped with a warning device that operates automatically while the vehicle is backing. The warning sound shall be of such magnitude that it will normally be audible from a distance of 200 feet and will sound immediately on backing. In congested areas or areas with high ambient noise which obscures the audible alarm, a signaler, in clear view of the operator, shall direct the backing operation.
(b) Those vehicles not subject to 1592(a) and operating in areas where their backward movement would constitute a hazard to employees working in the area on foot, and where the operator's vision is obstructed to the rear of the vehicle shall be equipped with an effective device or method to safeguard employees such as:

(1) An automatic back-up audible alarm which would sound immediately on backing, or

(2) An automatic braking device at the rear of the vehicle that will apply the service brake immediately on contact with any obstruction to the rear, or

(3) In lieu of 1 or 2 above, administrative controls shall be established such as:

(A) A spotter or flagger in clear view of the operator who shall direct the backing operation, or

(B) Other procedures which will require the operator to dismount and circle the vehicle immediately prior to starting a back-up operation, or

(C) Prohibiting all foot traffic in the work area.

§1597. Jobsite Vehicles.

Vehicles which are utilized on jobsites exclusively and are, therefore, excluded from the provisions of applicable traffic and vehicular codes shall be equipped and operated in the following manner:
(b) Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two headlights and two taillights in operable condition.
(c) All vehicles, or combination of vehicles, shall have brake lights in operable condition regardless of light conditions.
(h) The employer shall require the use of seat belts.

§1598. Traffic Control for Public Streets and Highways.

(d) During hours of darkness, warning garments shall be retroreflective. The retroreflective material shall be visible at a minimum of 1,000 feet. The retroreflective clothing, or the retroreflective material added to the clothing, shall have a minimum of one horizontal stripe around the torso. White outer garments with retroreflective material that meets the above requirements may be worn during hours of darkness in lieu of colored vests, jackets and/or shirts.

§1599. Flaggers.

(e) During the hours of darkness, flaggers' stations shall be illuminated such that the flagger will be clearly visible to approaching traffic and flaggers shall be outfitted with reflectorized garments. The retroreflective material shall be visible at a minimum distance of 1,000 feet. The retroreflective clothing, or the retroreflective material added to the clothing, shall have a minimum of one horizontal stripe around the torso. White outer garments with retroreflective material that meets the above requirements may be worn during hours of darkness in lieu of colored vests, jackets and/or shirts.

§4940. (Boom-Type Mobile Cranes) Lighting.

Boom-type mobile cranes which operate at night shall have their load hooks and working areas adequately illuminated.

APPENDIX F

NIGHT WORK AND CLOSURE REVIEW

LISTED BELOW ARE CERTAIN INSPECTION TIPS THAT CAN ENHANCE CONSTRUCTION CLOSURES WHEN FOLLOWED APPROPRIATELY

1. JOB LIMITS

Inspect your job limits, freeway, frontage roads, etc. for any unusual situations prior to starting to put down the closure. Look for any accidents, emergencies, road hazards, and stalled/abandoned vehicles within the proposed job limit or proposed detour route.

2. MEET WITH THE CONTRACTOR

Prior to the closure, meet with the contractor to discuss the scope of work for the shift and the closure limits, your presence at certain time frame for approval of certain tasks, force account work (if any), and minor items that the State may require to be done during the shift. Ensure you have phone numbers for both the project foreman/superintendent and Traffic Control representative. Ensure the contractor is aware of the closure time limitations and review the Traffic Contingency Plan (if warranted) prior to starting work. If during your inspection you notice anything out of the ordinary, bring it immediately to the contractors' attention (preferably to the person responsible for Traffic Control).

3. MEET WITH COZEEP (if on-site)

Discuss the plans with COZEEP and detail what operations you expect COZEEP to be performing in support of the planned closure. Ensure you swap phone numbers with the COZEEP officer to facilitate future contact should the need arise. Fill out the COZEEP report and ensure you meet with them at end of shift to have them sign out. (Note: For closures that present special concerns, such as multiple lanes closed, lane shifts, etc. it would be prudent to have COZEEP meet with the contractor foreman and/or traffic control person to ensure full understanding of the operation)

4. NOTIFICATIONS

Ensure that the appropriate TMC is notified of 10-97 (first cone down, begin closure) and 10-98 (last cone up, end closure). If you have to cancel a closure notify the TMC of a 10-22 (cancellation).

5. DETOURS

Determine if the detour is laid out and functioning properly. Drive through the detour and pay special attention to ensure it leads you through properly. Stop and observe driver reaction at any points where drivers need to turn onto another roadway to continue the detour. This will help you to evaluate detour efficiency.

6. RAMP CLOSURES

Make the 10-97 call when the first cone goes down and then check that the ramp is closed properly.

7. FREEWAY CLOSURES

When steps 5 and 6 have been completed (if required) the contractor may proceed with the mainline closure. Make sure to call in first cone down (10-97) and logs that are not going to be used (10-22 cancellations) for the shift to the TMC.

8. ROUTINE CHECKS

Monitor the closure on a continuing basis. Pay special attention to the end of queue. Sit and observe driver reaction at end of queue. If you note that drivers are panic stopping or braking heavily, review the sign package and see if something needs to be relocated to better inform drivers of the ongoing traffic control operation. Inspect all the signs, flashing beacons (check the flashing beacons to ensure that they are flashing in the proper mode and in the right direction), drive by the PCMS boards and see if the messages are clear and understandable and that you can see all the messages at highway speeds at required legibility distances. Ensure none of the lighted fixtures are too bright, such that their glare might blind oncoming drivers, if they are have the intensity lowered. Check the transition tapers for smoothness and uniformity, ensure the cones are properly spaced. When you drive through the opposite direction of your closure make sure none of the lighting is causing glare issues for drivers. If you do not see the contractor traffic control representative during your routine checks find out where he/she is and ensure they are complying with the contract requirements.

9. TEAM WORK

Ensure you make routine and regular contact with COZEEP and the contractor traffic control representative. Remember, COZEEP has other resources, via his radio, to inform you of events outside your work zone that may affect your traffic control. If an issue arises during the shift, consider having the COZEEP officer review it and provide an opinion. Remember, the officers are more in tune with State driving laws and their experience can be of benefit to your evaluation of an ongoing situation.

10. MAJOR INCIDENT NOTIFICATION

Contact the TMC immediately, giving a clear description of what, where, and when the incident happened and what you are requesting. Refer to NRCPC 18 for further guidance.

11. COMPLETION OF WORK

At the end of shift, when work is completed you will need to go through many of these steps in reverse.

12. PCMS SIGNS

Ensure all signs are deactivated and that the message face is turned perpendicular to traffic at the end of shift.

13. RECHECK JOB LIMITS

As a last check drive through the job and ensure that all signs, cones, and other traffic control devices have been removed or stored out of the way accordingly.

APPENDIX G

NIGHT WORK CHECK LIST

- ☐ **Verify and Review Contractor Code of Safe Practices on Night Work (if they have one)**
- ☐ **Tailgate meeting held to address safety for Night Work**
- ☐ **Contractor assigned Traffic Control representative identified and phone numbers exchanged**
- ☐ **COZEEP officer(s) signed in, duties/expectations outlined, and phone numbers exchanged**
- ☐ **TMC Closure Notifications made 10-97 (begin), 10-98 (end), 10-22 (cancel)**
- ☐ **Clean ANSI 107-99 Class 2 Vest (for all personnel) – 1000' visibility**
- ☐ **Work Vehicle / Equipment Lights (all work vehicles/equipment need two working headlights and tail lights, respectively)**
- ☐ **Signs have appropriate retroreflective background (no paper signs)**
- ☐ **Flashing Beacon on RWA Sign (12" lens required)**
- ☐ **Flagger stations illuminated to required 10 foot-candle minimum**
- ☐ **Work sites illuminated by light plant to required 10 foot-candle minimum**
- ☐ **Cones (700 mm tall)/Delineators retroreflective/in good condition**
- ☐ **Glare to on coming vehicles eliminated (check PCMS/Arrow boards/light plants)**
- ☐ **Necessary Notifications made by TMC to local agencies (CHP, Police, Hospital & Fire)**
- ☐ **Periodic checks of traffic control done, contractor asked to fix items (if necessary)**

Complete before work begins and only then allow work to start.

Inspected By:_____ **Date:**_____

Traffic Control Sketch Provided YES NO **File in Cat #6**