STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

MANUAL CHANGE TRANSMITTAL

NO. **05-1**

TITLE: Department of Transportation *Construction Manual*	APPROVED BY:  Robert Pieplow Chief, Division of Construction	DATE ISSUED: August 31, 2005
SUBJECT AREA Index and other areas of the *Construction Manual*	ISSUING UNIT Division of Construction	
SUPERSEDES CPB 04-3 and CPB 04-4	DISTRIBUTION All Requested Manual Holders	

The purpose of this manual change transmittal is to provide updates and corrections to the 2001 edition of the Caltrans *Construction Manual.* Please update your manual in accordance with the table below. The relevant pages are indicated in the table.

Section(s)	Remove Old Page(s)	Insert New/Revised Page(s)
Update: Chapter 1 Section 204, "Relations With Utility Companies and Other Public Agencies" is being replaced with a new section.	1-2.3 thru 1-2.4	1-2.3 thru 1-2.4
Update: Chapter 1 Section 308, "Training Methods," is revised for MUTCD.	1-3.3 thru 1-3.4	1-3.3 thru 1-3.4
Update: Chapter 2 Section 201, "References," Section 206F, "Lateral Shifting," and Section 207, "Speed Zones" to change Traffic Manuals to MUTCD.	2-2.1 thru 2-2.16	2-2.1 thru 2-2.16
Update: Golden Rod, Chapter 3, Section 7, "Legal Relations and Responsibility."(3-704E)	3-7.i thru 3-7.ii	3-7.i thru 3-7.ii
Update: Chapter 3 Section 3- 704E, "Highway Maintenance," is revised and renamed "Maintenance Within Construction Limits."	3-7.5 thru 3-7.12	3-7.5 thru 3-7.12

Update: Golden Rod, Chapter 3, Section 8, “Prosecution and Progress” is revised to add “Federal-Aid Contracts on the National Highway System.”	3-8i thru 3-8ii	3-8i thru 3-8ii
Update: Chapter 3 Section 807, “Termination of Control.”	3-8.31	3-8.31
New: Section 3-810A, “Termination of Contract” is added to include FHWA concurrence.	3-8.39	3-8.39
Update: Chapter 4 Section 1201, “General,” and Section 1203, “During the Course of Work,” are revised for MUTCD.	4-12.1 thru 4-12.4	4-12.1 thru 4-12.4
Correction: Chapter 4 Section 2003B (2), “Plants,” for a typo.	4-20.7 thru 4-20.8	4-20.7 thru 4-20.8
Update: Chapter 4 Section 3902A, “General,” and Section 3903B, “Street Operations,” are revised to include the optional use of tapered notched wedge device.	4-39.1 thru 4-39.10	4-39.1 thru 4-39.10
Correction: Golden Rod, Chapter 5, Section 0, “Conduct of the Work,” is revised to delete 5-008 and move it to Chapter 7.	5-0.i	5-0.i
Update: Chapter 5, Section 002, “Preconstruction Conference With Caltrans Personnel,” is revised to include additional personnel and entities. Section 5-007, “FHWA Involvement in Contract Administration,” for full oversight and state-authorized.	5-0.1 thru 5-0.11	5-0.1 thru 5-0.10
Correction: Chapter 5, Section 008, “Solid Waste Disposal and Recycling Reporting,” is moved to Chapter 7, Environmental.	5-0.11	none
Update: Golden Rod, Chapter 5, Section 3, “Contract Change Orders,” for full oversight and state-authorized.	5-3.i thru 5-3.ii	5-3.i thru 5-3.ii

Update: Chapter 5, Section 308A, "Full Oversight Projects," is revised to change Nonexempt to Full Oversight. Section 308B, "State-Authorized Projects," is revised to change exempt projects to State-Authorized. Section 311A, "Division of Construction Approval," and Section 312, "Copy to Distribution," are revised to change Nonexempt to Full Oversight.	5-3.19 thru 5-3.26	5-3.19 thru 5-3.26
Correction: Chapter 5, Section 314, "Examples of Contract Change Orders," to correct section numbers.	5-3.27 thru 5-3.28	5-3.27 thru 5-3.28
Update: Chapter 5, Section 406B, "Claim Payments Based on Negotiated Settlements."	5-4.19 thru 5-4.20	5-4.19 thru 5-4.20
Update: Golden Rod, Chapter 7, Section 109, "Solid Waste Disposal and Recycling Reporting" is added.	7-1.i	7-1.i thru 7-1.ii
Correction: Chapter 7, Section 109, "Solid Waste Disposal and Recycling Reporting," is moved from Chapter 5, Contract Administration.	7-1.21 thru 7-1.22	7-1.21 thru 7-1.23
Update: Chapter 9, Section 103A, "Requesting Additional Funds for Local Federal-Aid (Subvention) Projects," to change Nonexempt to Full Oversight projects.	9-1.3	9-1.3
Index	I-1 thru I-15	I-1 thru I-16

1-204 Relations With Utility Companies and Other Public Agencies

1-204
Relations With Utility Companies and Other Public Agencies

Good public relations with internal and external stakeholders will have a beneficial effect in completing a construction project within scope, schedule and budget. Preconstruction discussions that may affect Caltrans functional units or local agencies and communities should involve all stakeholders. The resident engineer should make early personal contact and establish a good working relationship with staff of affected utility companies and other agencies. Such agencies may include: local school districts, local transit agencies, permitting agencies, California Highway Patrol and local police organizations, local bicyclist and pedestrian advocacy groups, local community groups, and any other government agency or local group with interest in the project. Early personal contact with staff from these agencies and groups will acquaint them with upcoming construction operations and will enable them to have input and schedule their work or services to the best advantage of all concerned.

1-205 Relations With Property Owners

1-205
Relations With Property Owners

Another important part of public relations is courteously dealing with the property owners near the project. The owners are the ones most affected by construction operations.

By courteously listening to the property owner's problem, request, or question and by taking the time to explain or answer, the resident engineer can generate faith that Caltrans is not an impersonal organization running roughshod over the general public or the individual. Sometimes this human approach will reduce unreasonable demands and complaints by the property owner.

Construction operations (for example, temporary closures of streets and driveways and construction noise, especially at night) may have an adverse effect on nearby residents and businesses adjacent to the project. Informing business owners and residents near the project about the reason for, and the duration of, the activity will go a long way toward a higher degree of acceptance and tolerance. Timely notice is important. Also consider rescheduling construction activity around major business or public events.

Start public relations early. The fullest possible cooperation of the contractor's organization should be solicited to achieve good public relations most effectively. By calling on property owners together, the resident engineer and the superintendent can assure owners that inconvenience and the nuisance of noise and dust will be kept to a minimum. For some projects on metropolitan freeways, contractors have distributed their own informational folders to property owners. This practice should be encouraged.

1-206 Relations With the General Public

1-206
Relations With the General Public

The main differences in public relations toward the property owners and the general public occur in the scope of coverage and the degree of personal contact. When highway construction information must be conveyed to large numbers of highway users (including those who commute regularly over a particular route and those who use the route only occasionally), contact the public information officer early in the project. The most satisfactory method is for the officer to make full use of the press, radio, internet, and television to publicize the upcoming work.

Another proven method of promoting good public relations is to use district personnel as speakers at meetings of the local chamber of commerce and service clubs.

Resident engineers so inclined might consider joining a service organization. Frequent notices and progress reports in the local press are also very common and effective methods of keeping the public informed of changing project conditions.

On advice by the resident engineer, the district should also issue press releases. The district should contact members of the local press before the job starts, inform them how they can contact the proper person for information throughout the contract, and invite them to tour the project with the resident engineer. In special cases, the district may prepare and distribute pamphlets to motorists who are delayed as they pass through construction. If the traveling public outside of the district will be affected, the Caltrans information officer in Sacramento must be advised directly.

Project personnel should always keep in mind that they are representatives of Caltrans and the State of California. As such, they are expected to conduct themselves in a manner that will command respect and be a credit to the organization.

1-305 Resources and Budgeting

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As a minimum, individual construction employees must devote 2 percent of regularly scheduled work time to "in-service occupational training." In the 2 percent occupational training goal, do not include training other than that required in the occupational training plan. In addition to the resources for the 2 percent goal will be resources to sufficiently plan, prepare, and execute training instruction required to support the district's training and development plan. On average, organized in-service training may be distributed so that the average employee will spend approximately 2 percent of the time as a trainee.

1-306 Subject Matter, Trainees, and Instructors

1-306 Subject Matter, Trainees, and Instructors

The district construction administration must ensure the completeness and accuracy of the information disseminated through training and development activities. The Division of Construction, workforce development unit, will support, coordinate, and assist the district to the full extent of its abilities and resources.

Instructional subject matter for a course should be sufficiently broad to encompass all aspects of an operation or area of activity to which a person may be assigned. Occupational instruction should be offered close to the time when personnel will be required to use the job skills.

Personnel and consultant trainers who prepare and conduct training must be qualified in the subject matter and in the theory and techniques of training. Assistance for determining training expertise and training for trainers is available through the Division of Construction.

1-307 Just-in-Time Training

1-307 Just-in-Time Training

Some contract special provisions provide for "just-in-time training," which is joint training with industry and construction staff. This training should include all contractor and Caltrans staff who are directly involved in the construction operation. The objective of this training is to introduce new practices, improve workmanship, improve quality, and to provide current and timely training to the people actually performing the work.

1-308 Training Methods

1-308 Training Methods

In-service training can be handled in various ways. Depending on the particular subject, different methods may be appropriate. In all instances, encourage instructors to use learning techniques that involve their students rather than techniques that simply use lecture. Whenever possible, students should be provided with the opportunity to perform a task shortly after receiving instruction and watching a demonstration. Classes for inspectors should be participatory and include "guided discussions" that encourage and promote an exchange of ideas and experiences among participants.

Caltrans construction uses the following basic training references:

- *Construction Manual*
- *Standard Specifications*
- *Standard Plans*
- District construction manuals
- *Highway Construction Checklists*

- *Manual on Uniform Traffic Control Devices (MUTCD)* and *MUTCD California Supplement*
- *Maintenance Manual*
- *Manual of Test*
- Other technical publications

The Division of Construction also has a number of training videos available for checkout. Many districts also have training videos available for staff viewing.

A highly effective method of industrial training and development is on-the-job training and mentoring by pairing less experienced staff with seasoned construction personnel. The supervisor must be careful to pair individuals with compatible personalities. The mentor should be knowledgeable and well versed in current Caltrans standards. The student can enhance the effectiveness of this training technique through the ability to respect the experience of the mentor, be genuinely interested, and become actively involved in the training process.

Occupational training must be accomplished as an organized effort followed by on-the-job experience. Certainly no complete substitute exists for experience, and often a well-regulated, on-the-job training program is an excellent method for the completion of instruction. It is just as certain that on-the-job experience is not necessarily synonymous with on-the-job training.

The districts must make every effort to coordinate their training activities with the other districts. For example, each of three districts may have only two or three people in need of training in a specific subject. It is preferable, therefore, to combine employees from the three districts to create one class. The districts and the Office of Structure Construction can also exchange qualified instructors.

Section 2 Traffic

Section 2
Traffic

2-201 References

2-201
References

Section 124 of the Streets and Highways Code authorizes Caltrans to close or restrict the use of any state highway whenever Caltrans considers such actions necessary for the following reasons:

- To protect the public
- To protect a highway from damage during storms, after major earthquakes, or other natural disasters
- To protect a highway during construction, improvement, or maintenance operations

Traffic control systems conform to the *Standard Plans*, unless the contract specifies otherwise.

All signs, lights, and devices must conform to Section 12, "Construction Area Traffic Control Devices," of the *Standard Specifications*. For how to apply signs, lights, and devices used on construction projects, review the current version of the *Manual on Uniform Traffic Control Devices (MUTCD)* and *MUTCD California Supplement.*

2-202 Objective

2-202
Objective

The objective of this section is to provide for worker protection and the safe passage of public traffic through and around construction with as little inconvenience and delay as possible.

2-203 Planning

2-203
Planning

Providing for worker safety and the safe movement of traffic through construction zones starts with planning. A traffic control plan must be included in all contract plans and special provisions. Before the district submits the plans, specifications & estimate to headquarters, the district construction plans and specifications reviewer must review the plan.

The plan must be adequate for conditions that will be encountered during construction. The reviewer should determine that the plan can be implemented and that it adequately facilitates the movement of traffic. Any comments or suggestions regarding traffic control should be discussed with district design and traffic units during the project's planning and design phase.

2-204 Responsibilities and Procedures

The following outlines the responsibilities and procedures for each of the key personnel involved in traffic control.

2-204A Resident Engineer

The resident engineer has the responsibility and authority for administering the traffic control plan and all other aspects of safety on construction projects. The resident engineer may delegate the administration of traffic control to another person assigned to the project, preferably to the project safety coordinator. For the duties and responsibilities of the project safety coordinator, see Section 2-1, "Safety," of the *Construction Manual* (manual).

Once assigned to the project, the resident engineer should perform the following administrative duties:

- Compare the plan for traffic handling to the conditions found at the site. Note any unusual local traffic movements and the movements of emergency vehicles. Include in the preconstruction conference a discussion of the traffic control plan. For details related to preconstruction conferences, see Section 5-003, "Preconstruction Conferences with the Contractor," of this manual.
- Modifications of the traffic handling plan may be considered at this point. Given the specifics of a contractor's needs, it may be possible to provide improved traffic service over the service originally contemplated. Changes requested by the contractor must provide at least equal traffic service to receive favorable consideration.
- Changes made in existing contract plans and specifications or new plans and specifications covering unanticipated conditions or conditions not fully delineated in the contract must be covered by contract change order. Such ordered changes must include plans in sufficient detail to define all elements of the proposed changes and roadway design.
- The district will establish a procedure for the preparation, review, and approval of changes related to roadway construction and detour plans that include signs and other traffic control devices. Generally, the district traffic unit is responsible for this review activity.
- Some unpredictable, immediate situations of a minor nature or short duration will arise during the work and will require good judgment to obtain optimum results. In these instances, formally approved plans are not required, but delineate or specify what is to be done and record in writing actions taken and orders given.
- To establish the geometry, markings, devices, and signs that existed at any time during the project, maintain in sufficient detail a record of the placement into service, changes, and discontinuance of roadways and detours. The form of the record may vary according to the magnitude and complexity of the subject. Dated notations or revisions to plans may be helpful. Dated photographic or video tape records, particularly of points of transition or difficult situations, may be very valuable.
- If the contractor's operations interfere with or cause potential safety problems with vehicular or pedestrian traffic, contact the contractor immediately and request correction of the deficiency. If necessary, direct the contractor in writing to act at once to remedy the unsatisfactory situation. Caltrans work

forces should be called upon only when necessary, because of a physical inability of the contractor or a refusal by the contractor to act. A contractor's failure to perform is cause to order the cessation of the operations.

2-204B State Representative

Where the contract is administered by others, oversight of traffic through and around a construction zone involves overseeing and working with the local entity or private sponsor's resident engineer. The state representative assigned to the project must make sure the resident engineer performs the duties as outlined above.

For all changes to the district approved traffic control plans on contracts administered by others, use the same review and approval process established for projects administered by Caltrans.

As a last resort, the state representative has the authority to stop the contractor's operation wholly or in part or take appropriate action when public safety is jeopardized.

2-204C Construction Safety Coordinator

Section 2-1, "Safety," of this manual covers the duties of the district's construction safety coordinator. Here we further detail the coordinator's duties related to traffic handling.

The district's construction safety coordinator must periodically review the traffic handling for each project. Some reviews should take place at night, particularly when a major traffic change has taken place. The coordinator must document these reviews in the project records and discuss any apparent deficiencies in the traffic control plan or problems in traffic safety with the construction engineer, traffic engineer, and resident engineer. Instead of the construction safety coordinator, a specialist from the district traffic unit may perform the traffic reviews provided the required documents and discussions are included in the project records.

2-204D Construction Engineer

A construction engineer is responsible for ensuring that traffic handling through construction projects conforms to the specified traffic control plans. If the plans are modified by contract change order, construction engineers must take the necessary steps to ensure that the modified plans are adequate to provide the highest level of traffic safety and service consistent with the conditions actually encountered. During routine visits to the project, construction engineers should also include reviews of signing, delineation, and general traffic handling.

2-205 Guidelines for Traffic Control Plans

2-205 Guidelines for Traffic Control Plans

The following are some basic guidelines and general considerations for traffic control plans.

2-205A Basic Instruction

The following instructions usually apply more to the planning and design phase of a project. They are included here to help provide construction personnel with some basic concepts for safe and efficient traffic flow through a highway construction project. Use these guidelines when it is necessary to make changes in traffic control plans during construction.

- Whenever possible, permit traffic continued undiminished use of the existing facilities.
- When such use is not possible, accommodate traffic by ensuring a continuous

roadway throughout the length of the project. To ensure this continuous roadway is achieved, use one or a combination of the following:

1. The existing unmodified highway
2. The newly constructed highway or portions of it
3. Interim constructed facilities
4. A detour where traffic is diverted over a temporary roadway
5. Allowing traffic to pass through the work in progress

- Ensure the temporary roadway is engineered to the highest standards practically possible. Apply the same type of design considerations as those incorporated into the new construction. These considerations include the following:

  1. Geometrics of alignment and roadway section
  2. Surface of the traveled lanes and shoulders or marginal areas
  3. Pavement markings and other delineations
  4. Barrier and guardrail
  5. Signals and lighting
  6. Signing

- Show the design of the temporary roadway in the traffic control plan.
- Make safety and convenience the first design consideration. Economy will be a factor only as it is necessary to obtain balance between benefits and resources. By itself, cost must not be a primary limiting factor.

2-205B General Considerations

There is no formalized solution and design that applies to all situations. The following guidelines are intended only to guide engineering judgment and ingenuity:

- The engineer's job is to create a physical facility that will induce motorists to make the proper responses to guide their vehicles in the intended path of travel and that will make it possible for the vehicle to react as intended.
- The path the car is intended to follow, the traffic lane, is the most important single element of the roadway. The following are elements that affect the driver's ability to follow the intended path:

  1. The lane's geometry
  2. Pavement surface condition, texture, and color
  3. Pavement markers and other delineation
  4. Signals, lighting, and signing.

- Try to eliminate surprise elements from temporary roadways. Make the environment like the approach highway, but if differences must exist, make the differences clearly apparent.
- Accident concentrations and inconvenience often occur with changes in direction,

number of lanes, alignment, and necessary change of speed. Compensate for a required reduction of one by an improvement of another. For example, compensate for a sharper curve with solutions such as an increased lane width or a runoff area.

- Visualize what effect the changing conditions of visibility and lighting will create. Glare conditions such as rain at night or facing the setting sun may impact driver decisions. Such conditions may alter the apparent pattern of the roadway and cause an eradicated line to appear to be a lane line. Consider how the shape and the light versus the shadow of falsework openings will appear both in day and night. Anticipate any needs for special treatments such as lighting.
- Review the project for evidence of driving difficulty. For instance, look for such signs as broken delineators, skid marks, and tire marks on temporary railing (Type K), all of which indicate a potential need for improvement. Be aggressive in seeking changes to improve the situation. Continue this appraisal through the life of the project. Each day a condition can change that may have an impact on the facilities' effectiveness.
- Reductions in the width or number of lanes affect the capacity and the traffic flow. When severe congestion is forecast because of capacity reductions, include plans for media notification, alternate route development, metering via upstream ramp closures, and use of changeable message signs.

2-206 Elements of a Roadway

2-206 Elements of a Roadway

The following are some guidelines for the design of roadways carrying traffic through construction areas:

2-206A Geometrics

For conditions shown on the plans that need adjustment, discuss any proposed changes with the district traffic unit. Include the following considerations for conditions requiring minor changes in the field:

- Design for the speed vehicles will travel, not the speed one hopes they will travel. The following determine the safe speed of a vehicle:
  1. Alignment
  2. Profile
  3. Cross section
  4. Pavement surface character
  5. Lateral clearances to obstructions
- On the mainline facilities, design the temporary roadway for speeds consistent with the permanent roadway. On highways where the prevailing speed of the approach is limited by alignment, the design speed should be equal to the prevailing speed of the approach roadway. If this equality is not possible, ensure the design speed differential is no more that 15 km/h. The geometrics for a transition at the end of a high speed approach should be better than the geometrics that may be adequate for a situation within the construction area.
- Locate the approach transition so that it is visible to the approaching motorist.

Avoid placing the entering transitions on horizontal curves, just beyond horizontal curves, or beyond the crest of a summit vertical. The transition should be completed before reaching such features. The ideal transition is on a horizontal tangent with a slightly rising grade at the end of a level approach. Achieving this transition is worthwhile even though it may extend the traffic control system farther than the minimum necessary to just clear the construction area.

- If physically possible, in the transition give the driver at least the same effective traversable roadway width, and preferably more, as on the approach roadway. Adequate maneuver room at critical points is an important factor in preventing accidents.
- Design to require the least change, whether in change of direction, speed, or both. When changes are necessary, make one change at a time. For example, if the number of lanes must be reduced and the direction changed, complete the lane drop before starting the alignment change.

2-206B Cross-Over Transitions

The following guidelines apply to cross-over transitions:

- Design cross-over transitions to the highest geometric standards within tolerable limits of cost. Use flat diagonal crossing in preference to reversing curves.
- When cross-overs require the removal of median barriers or protective devices, review conditions, and where possible, maintain the integrity of the remaining portions of the devices. For example, anchor guardrail ends and install crash cushions.
- When cross-overs are not in use, place positive barriers across entry areas, including appropriate signing.

2-206C Existing Ramps

For temporary modifications of existing ramps, pay close attention to acceleration and deceleration lanes. Reducing standards on existing facilities, such as sharpening curves and shortening auxiliary lanes, can adversely affect the operating characteristics. Supplemental construction work may be necessary to retain the effective operating characteristics of the existing facility.

2-206D Run-Off Area

Whenever physically possible, establish and maintain a safely traversable area outside the delineated roadway of such width that there will be a run-off zone. To enhance night visibility, delineate material, equipment, excavations, or obstructions 4 m or more from the traveled way (outside of normal required protection parameters). Creating safe run-off areas may also require ordering the staging of certain elements of the work, cleanup grading, and temporary placement or removal of materials.

2-206E Lane Widths

Lane widths should be consistent with the widths of the approach roadway. A desirable standard consists of full-width lanes plus an effective width of constructed shoulder. To provide extra maneuvering room, provide wider lane widths or additional surfaced shoulder width in transitions and critical alignment.

2-206F Lateral Shifting

Construction situations frequently require a lateral shifting of traffic in relation to the normal path of travel. This lateral shift may involve dropping a lane. Use the standard formula for taper length as shown in the *Manual on Uniform Traffic Control Devices (MUTCD)* and *MUTCD California Supplement* or in the details included in the project's traffic control plan.

Before opening lanes to traffic, remove or obliterate all conflicting lines and markings. Day and night and under all weather conditions, obliterated lines and markings must be unidentifiable as pavement delineation.

2-206G Surfacing Materials—Color and Texture

The following guidelines apply to the color and texture of pavement surfacing materials:

- Surface all roadways and detours, except very temporary or minor facilities, with an appropriate material (in most cases asphalt concrete).
- The area where the surfacing joins the existing roadway can be very critical. If asphalt concrete joins asphalt concrete the difference in texture and color between the existing and new creates a taper in the new traffic lane that may convey the wrong sense of direction, especially at night or in rain. An inevitable degree of mismatch between the old and new surfaces creates a slight discontinuity that may cause a car to lurch or swerve. Avoid these difficulties by bringing the temporary surfacing back onto the existing highway in a square joint.
- A square joint is even more necessary when asphalt concrete joins portland cement concrete because at night and during rainy weather the joints often stand out more prominently than the traffic lane lines.
- When conditions prevent starting the temporary surfacing at a square join on the existing pavement, the necessary continuity of the traveled lane can be established by a treatment such as a light sand seal. Establishing continuity of the traveled lane in some manner is especially necessary if previous traffic shifts have created confusing or conflicting diagonal joints and have eradicated pavement markings.

2-207 Speed Zones

2-207
Speed Zones

The following guidelines apply to speed zones:

- If the safe operating speed of traffic through a construction area is significantly less than the approach speed of traffic on the highway, a reduced work zone speed limit may be established.
- Do not use a reduced speed limit as a substitute for other means of creating a safe roadway.
- Establish reduced speed limits in accordance with the procedures stated in the *Manual on Uniform Traffic Control Devices (MUTCD)* and *MUTCD California Supplement*. The district construction and traffic units must jointly review and agree to these limits. Also, it is advisable to discuss the limits with the California Highway Patrol. Participation in the Construction Zone Enhanced Enforcement Program (COZEEP) is a precondition for any project for which a reduced speed zone is proposed. See the heading “Construction Zone Enhanced Enforcement Program” later in this section.
- To avoid the necessity of obtaining more than one order for speed reduction per project, ensure the limits requested in the order cover the maximum distance where reduced speed would be required at any time during the life of the contract. Any part of the project within the limits stated in the order becomes a legal speed zone when signs are in place and displayed.
- It is imperative that the speed limit be posted only for the duration of the conditions justifying the reduction and only for those areas of the project within which it is unsafe at any and all times to travel at a speed in excess of the posted limit.

- Speed limit signing may be considered during work operation parameters. When work operations are complete for the day, remove or cover the signs immediately. Implement temporary speed limit reductions in conjunction with a COZEEP operation.
- Use the posting of advisory speeds on appropriate warning signs to advise the public of what speed is considered appropriate at specific localized situations such as points of curvature or traffic diversion. The selected speed should be that at which the driver exercising due care would drive in normal conditions of light and weather.

2-208 Night Work

2-208 Night Work

Frequently the special provisions for a project restrict work on the existing traveled way to a specified period at night. Based on traffic counts, the district traffic unit determines times for closing lanes and for night work.

The effectiveness of handling traffic through night construction depends upon the contract plans and upon the details of the contractor's operations. Require the contractor to submit and obtain approval of the plan or operations before proceeding with night work. Also, here are some details to consider:

- Avoid traffic splits if at all possible. Shift traffic to one side or to the other, but do not split it into two traffic streams. This requirement sometimes requires the closure of an extra lane.
- Confine the work area to as short a distance as is practical.
- The immediate work area should be well lighted by floodlights, but in such a way so as to not blind drivers of approaching vehicles. (See Section 7-1.06, "Safety and Health Provisions," of the *Standard Specifications*.) If properly shielded, most of the floodlights can be mounted on construction equipment. Ensure the intensity of the lighting is not any brighter than is necessary for inspection work.
- Ensure the contractor's plan of operation provides sufficient room for delivery vehicles so that none are ever forced to stop in the traffic lanes.
- Providing for exit ramp traffic within the limits of the coned-off area may be extremely difficult. Sometimes through traffic tends to follow an exiting vehicle. To expedite the work, it is helpful to temporarily close the exit if traffic patterns and volumes permit.
- In addition to the requirements for signs and warning devices shown on the plans for traffic control systems, changeable message signs in advance of the work may be used effectively. See Section 4-1203J, "Portable Changeable Message Signs," of this manual. You may also consult the district traffic unit.
- Use road flares to get motorists' attention only under emergency conditions. Take care to prevent fires in susceptible high-fire rated areas.
- For the use of amber flashing lights and for driving and parking in a closed lane at night, see the *Caltrans Safety Manual*.
- Either through illumination or suitable marking, ensure all equipment is visible to traffic.

- During daylight hours, mark in advance signs and lane closure locations. The resident engineer should review lane closure layouts for visibility and effectiveness. When possible, mark in advance cone locations so that cones may be placed quickly and accurately and the resulting line of cones will be straight and correctly spaced.
- The *Construction Safety Orders*, Article 11, 1599 (e) requires flagger stations to be illuminated during the hours of darkness. The traffic control system for flaggers should follow Sheet T13 in the *Standard Plans*. Ensure that all flaggers are clearly visible to traffic and that their positioning is safe and effective.
- Workers on foot must wear white or light-colored clothing. Caltrans policy requires Caltrans employees to wear white outer garments. White coveralls are available for state employees. All persons must have reflective markings on their safety garments during the hours of darkness. Reflective material on the vest or outer garment must be visible for a minimum of 300 m, be designed to identify the wearer as a person, and be visible through the full range of body motions. Consider exceptions to the use of white clothing in dense fog or snow areas.
- To maintain the cones, signs, and other safety devices, the contractor must patrol the project's traffic control systems.
- Personnel, representing Caltrans and the contractor, who are capable of and empowered to make decisions quickly if the need arises, must be on the job at all times.

2-209 Delineation

2-209 Delineation

According to Caltrans policy, no undelineated roadway can be opened to unrestricted or uncontrolled traffic. Before opening a roadway to unrestricted public traffic, delineation must be in place. Delineation can be accomplished by one or a combination of the following procedures:

- Placing the final delineation on the roadway
- Using either long-term or short-term temporary delineation
- Using channelizing devices

For a detailed discussion of acceptable temporary delineation methods, see Section 4-12, "Construction Area Traffic Control Devices," of this manual. For a discussion of final delineation and pavement markings, see Section 4-84, "Traffic Stripes and Pavement Markings," of the manual.

2-210 Ramp Closures

2-210 Ramp Closures

Whenever possible, avoid the prolonged closure of freeway ramps when the closure may adversely affect local businesses. Where ramp closures cannot be avoided, minimize the adverse effects to the greatest extent possible.

During the planning and design phase of any project, an impact study is made for any proposed prolonged ramp closure. Local businesses that may be affected are included in the public distribution of the environmental document and are notified of any public hearing.

The district construction unit must request an impact study for any proposed prolonged ramp closures not formally considered in the planning or design phase. Contact the project manager to arrange for the study. It is not necessary to restudy impact previously studied during planning and design unless significant commercial development has occurred in the area in the interim. Before making a decision to approve any contract change order that would result in a prolonged ramp closure, weigh the results of this study with other factors, such as construction costs, travel costs, delay, and safety.

Also, request an impact study for ramp closures of short duration where the possibility exists of adverse effects or where sufficient public concern exists to identify effects on adjacent businesses.

2-211 Informing the Public

2-211 Informing the Public

Timely publicity can significantly improve traffic behavior on a construction project. A motorist who is forewarned of construction conditions will be more tolerant of delay and inconvenience and probably will be more alert and responsive to construction zone control.

The resident engineer must ensure that information on project road closures, new road openings, traffic rerouting, and changes in traffic conditions is made available in advance for local publicity. Follow the district's instructions for distributing news releases. For guidelines on public information, see Section 1-206, "Relations with the General Public," of this manual.

2-212 Keep it Clear and Clean

2-212 Keep it Clear and Clean

To ensure safety and convenience, plans are prepared to provide unobstructed roadways. Periodic project safety reviews should note deficient areas and recommend corrective action by the contractor. During these reviews, examine the locations of planned roadside obstacles along with protective safety devices, signs, stripe, detours, falsework, temporary railing (Type K), attenuators, and run-off zones. Retain documentation of these reviews in Category 6, "Safety," of the project records.

Frequently, the only exception to an otherwise clean roadside is a localized situation such as a partially completed drainage structure or a pile of rubble. Do whatever is necessary to maintain an unobstructed roadside when construction is not in progress.

Ensure all traffic control facilities are kept in good repair. A continuing program of inspection, replacement, and cleaning is necessary.

2-213 Roadways Over Railroad Tracks

2-213 Roadways Over Railroad Tracks

When construction activities involve railroad right-of-way or grade crossings, contact the district railroad liaison agent to ensure that all processes are complete and that the contractor may begin work. The railroad company should be represented at a preconstruction meeting to discuss the schedule of work over or near railroad facilities.

The district railroad liaison agent must report to the Public Utilities Commission any proposed detours that include a railroad crossing at grade, where the volume of state highway traffic will materially increase normal traffic using the crossing. Provide the following information to the district railroad liaison agent (who will forward it to the Public Utilities Commission):

- The Public Utilities Commission crossing number as shown on the railroad crossing sign

- The existing protection at the crossing
- The date the detour will be put into use and the estimated time it will be in use
- The estimated volume of traffic to be detoured over the crossing
- Whether or not any additional protection is proposed

If construction involves any structure work, send a copy of the above information to the Office of Structure Design.

Contractors must make their own arrangements with the railroad representative to move materials or equipment across railroad tracks. Should it be required, a contractor must obtain a private crossing agreement.

2-214 Transportation Management Plans

2-214 Transportation Management Plans

Transportation management plans, including increased ride sharing, service patrols, local agency traffic control officers, and extra media effort, in addition to conventional traffic control activities, have been developed by many districts to cover one or more contracts. The district construction office and the resident engineer must ensure that the contractor's activities are compatible with the transportation management plan that affects the project.

2-215 Construction Zone Enhanced Enforcement Program

2-215 Construction Zone Enhanced Enforcement Program

The Construction Zone Enhanced Enforcement Program (COZEEP) is based on a statewide master agreement between the California Highway Patrol (CHP) and Caltrans. Under the agreement, Caltrans pays the CHP for furnishing officers and cars for use in construction zones. Use the following guidelines and procedures to implement COZEEP.

2-215A COZEEP Guidelines

The intent of the following guidelines is to provide a more uniform application of COZEEP resources throughout the state. Use the guidelines when determining when and how COZEEP is to be used on a project. Document the basis for COZEEP use.

2-215A (1) Estimating Funding

Consult your district COZEEP coordinator for a current estimate of hourly and mileage COZEEP cost.

2-215A (2) Redirection of Project Funds

In the detailed estimate, the initial funding level for COZEEP will be shown as supplemental funds for state-furnished materials and services. If additional funds are required during the life of the project, available contingency funds can be transferred to "state-furnished materials and services—COZEEP." Likewise, unused COZEEP funds may be transferred to the contingency fund and used for other purposes.

2-215A (3) Obtaining Additional Funds

Additional funds may be obtained for capital projects and maintenance funded projects as follows:

- Capital projects—If insufficient funds are available in both the supplemental work funds and the contingency funds, propose a fund request. The request may be processed under the G-12 process or may require a California Transportation

Commission supplemental vote. The request should be processed, justified, and documented in the same manner as any other fund request.

- Maintenance funded projects—On maintenance projects, obtain additional funding through a request to the district maintenance unit.

2-215A (4) Responsibility of the Project Engineer

On every project that requires the contractor to close traffic lanes, the project engineer must assess the need for COZEEP. This assessment will be reviewed as part of the project's safety review, constructability review, or both. The project engineer may recommend which specific construction operations should use COZEEP.

The project engineer should include adequate COZEEP funds in the project estimate. Look in the resident engineer's pending file for the design assumptions and estimate calculations.

2-215A (5) Responsibility of the Resident Engineer

The resident engineer must administer the COZEEP program on the project. If COZEEP services are not available, then exercise judgement about whether to allow the work to proceed. If you do not permit the work to proceed and the controlling operation is adversely affected, you may grant a time extension in accordance with Section 8-1.07, "Liquidated Damages," of the *Standard Specifications*.

If the contractor requests additional CHP support beyond that which is included in the project plan, the resident engineer may, if appropriate, write a change order. The contractor must bear the costs and expenses for additional support from the CHP, and all associated costs are deducted from monies due to the contractor.

When evaluating cost reduction proposals and contract change orders requested by the contractor, take into account the costs and savings for COZEEP services.

Initiate and obtain CHP sign-off of Form CEM-2101, "COZEEP Daily Report." At the end of each CHP pay period, report the COZEEP used during the pay period to the district COZEEP coordinator.

2-215A (6) Using COZEEP on Freeways and Expressways

Every attempt should be made to provide COZEEP for the following situations:

- All daytime or nighttime temporary closures of all lanes in the same direction of travel (full freeway closures)
- Nighttime closures of two or more lanes on a freeway with three or more lanes of travel in the same direction

Consider all other closures on a project specific basis.

In general, COZEEP is not necessary when only one lane is closed on freeways with four or more lanes in the same direction of travel.

2-215A (7) Using COZEEP on Connectors and Ramps

For all lane closures on freeway-to-freeway connectors and for night closures of exit and entrance ramps, evaluate the risk factors. Daytime ramp closures usually do not need COZEEP.

2-215A (8) Using COZEEP on Conventional Highways

For complete highway closures and for nighttime closures of one or more lanes on multilane highways, evaluate project specific risk factors. In general, lane closures on two-lane highways and daytime closures on multilane highways do not require COZEEP.

2-215A (9) Risk Factors

The risk factors discussed below are not intended to be an all-inclusive listing. The safety reviews conducted during the project's development may identify other risks. If so, also consider these risks in the decision-making process.

- Worker escape routes may be blocked by a median barrier, bridge rail, or a retaining wall. Lack of escape options increases the likelihood of motorist involved accidents that will disrupt the traffic flow.
- Night construction activities that do not create an obvious construction zone except while operations are in progress create an unexpected condition for the driver, even to drivers familiar with the highway. Examples of these activities include pavement slab replacement, resealing bridge expansion joints, and replacing pavement markers.
- Construction activities, such as night paving, are a risk factor when they require a large number of truck movements into and out of the work area.
- End-of-queue management is desirable at locations where traffic queues are unavoidable.
- Speed management is desirable at locations such as rural freeways and expressways where traffic has been flowing in a high speed, free flow way for a significant period before encountering the work zone.
- Rural locations with a high volume of truck traffic, steep down grades, or both, also pose a high risk factor.

2-215A (10) Estimating COZEEP Funding Requirements

The cost estimate used in the plans, specifications, and estimate is based on the expected number of occurrences of the events needing COZEEP that have been identified during project development. This cost estimate should include an estimated number of COZEEP service hours and travel time converted into an equivalent dollar cost.

When estimating COZEEP hours, take into account the following CHP operating policies:

- CHP policy requires that between the hours of 10:00 p.m. and 6:00 a.m., two officers must be in each unit. (The Department obtained an exception to have one officer per vehicle whenever there are two or more units in close proximity of each other on the same project.)
- CHP officers are reimbursed at time and a half (officers provide COZEEP services on overtime).
- The CHP Memorandum of Understanding requires a minimum payment of four hours per officer.
- All times and mileage are based on the officer starting and stopping time at his or her reporting station and must include travel to and from the project.

The district COZEEP coordinator will provide current hourly and mileage reimbursement costs for the project location.

The project engineer should include in the project estimate the funds necessary to provide COZEEP as state-furnished services and supplies. The basis of the project engineer's estimate should be included in the resident engineer's pending file.

2-215A (11) COZEEP Procedures

The following procedures are intended to assist resident engineers in obtaining and tracking COZEEP services. These procedures were also designed to help Caltrans reconcile the CHP billing system and facilitate payment to the CHP.

2-215A (12) Ordering Work

The statewide master agreement for COZEEP requires that all Caltrans requests for support be received by the supporting CHP area office during normal working hours and at least 72 hours before the time needed.

2-215A (13) Completing the Task Order

To order work by the CHP, use and complete Form CEM-2102, "COZEEP/ MAZEEP Task Order."

Before ordering the work, the resident engineer preparing the task order should check the following:

- That the CHP support is appropriate for the type of work to be performed
- That the request has been submitted in a timely manner
- That the project has sufficient funds available to pay for the CHP support

Ensure the task order, which has five parts where information must be entered, is completely filled out. Most of these parts are self explanatory. In Part 4, identify a Caltrans project supervisor, which in most cases will be the resident engineer or an assistant resident engineer.

You may submit a single task order to cover more than one day. For example, a project that will occur on Monday through Thursday for the next week would require only one task order. However, do not submit task orders that do not specify by date and time when a service is needed.

Once the task order is completed and signed by the Caltrans person requesting the services, fax or send it to the local CHP area office. The CHP coordinator at the local CHP area office will complete and sign the form and then return it to the Caltrans construction office.

2-215A (14) Cancellations

If it becomes necessary to cancel the work, contact the local CHP contact person listed in Part 4 of the task order as soon as possible. The statewide agreement requires that all cancellations be made during normal working hours and at least 24 hours before the time that the CHP is to arrive on the project. The cancellation may be written or called in by phone. If the cancellation is made by phone, ensure it is also confirmed in writing (complete Form CEM-2103, "COZEEP/MAZEEP Cancellation Form"). Once contact is made, the CHP coordinator will return the completed cancellation form.

In accordance with the agreement, cancellations received less than 24 hours before work is to begin will be charged a cancellation fee. If you cannot contact the officer in advance and the officer actually reports for duty, the fee will be equal to 4 hours of overtime pay. The local CHP contact person will note in the cancellation form if Caltrans is being charged with a cancellation fee or a 4-hour overtime fee. If the cancellation form indicates a fee is being charged, retain the notice in the project records under Category 21, "Construction Zone Enhanced Enforcement Program" and send a copy of the cancellation form to the district COZEEP coordinator.

For more information on cancellations, refer to the current COZEEP agreement.

2-215A (15) Recording Work Performed

When the officer or officers arrive at the project site, the senior CHP uniformed officer will check in with the Caltrans project supervisor. The project supervisor must initiate Form CEM-2101, "COZEEP Daily Report." The daily report number will also be the project expenditure authorization. In the daily report, enter a description of the services the CHP provided, for example providing traffic breaks, stationary patrol upstream of the work area, or circulating patrol. Also complete the CHP officer and CHP vehicle information. At the end of the shift, the senior CHP officer on the site must estimate the travel time and mileage for each officer to travel from the project site to the CHP office. Calculate the total estimated travel time and mileage and enter the total on the COZEEP daily report. Both the senior officer and the project supervisor must sign the completed COZEEP daily report.

The CHP has five working days to notify Caltrans if the actual travel time, mileage, or both, is greater than the allowances estimated on the daily report. The CHP notification must be submitted to the person who issued the daily report. If a notice of change is received, attach a copy to the resident engineer's copy of the COZEEP daily report and submit the original to the district COZEEP coordinator.

2-215A (16) Tracking Expenditures

Once the district COZEEP coordinator receives the COZEEP daily reports, they must be logged into the COZEEP service summary to track COZEEP use. A spreadsheet may be used for the summary.

Within 15 working days of the end of the CHP's pay period, the district COZEEP coordinator must electronically submit, either through e-mail or on a diskette, the COZEEP service summary to the accounting department at the CHP's headquarters. This electronic submittal must be confirmed with a hard copy.

The CHP will verify this report against its payroll records and add appropriate cost information to the spreadsheet. The CHP will then return the COZEEP service summary in electronic format with a confirming hard copy to the district COZEEP coordinator for payment.

2-215A (17) Reconciling the CHP Invoice

The CHP invoices will include monthly charges for services provided by a CHP area office. The backup for the invoice will include a printout of the COZEEP service summary and copies of any cancellation notices.

The COZEEP service summary, including cost information, must be resorted and subtotaled by project, verified and signed by the district COZEEP coordinator, and submitted for payment to the Caltrans Division of Accounting Services. This spreadsheet will serve as the Division of Accounting Service's "receiving record" for payment.

During the term of the contract, the CHP may increase or decrease the rates shown in the contract by notifying the Caltrans statewide contract managers, who in turn will notify the district coordinators. For this reason, district coordinators should not return an invoice to the CHP because the billing rates shown on the invoice do not agree with the rates in the contract. In this situation, the district coordinator should contact the statewide contract manager to verify the correct billing rates.

2-215A (18) Problem Resolution

Drop from the COZEEP service summary any inconsistencies between the information Caltrans gives the CHP and the CHP's internal information obtained from its payroll system. Return the exceptions to the district and area offices involved for resolution. Every effort to resolve disputes at the lowest level (between the resident engineer and the CHP coordinator at the local CHP area office), must be made. If an impasse occurs, the district COZEEP coordinator and the designated contact person in the CHP division office must act as the second level of review. The last level of review will be the COZEEP statewide coordinator and the CHP statewide coordinator.

Section 7 Legal Relations and Responsibility

The specification for relieving the contractor of responsibility for damage to completed permanent facilities only applies when a section of surfacing or the deck of a structure has been completed and opened to public traffic. Such relief is also dependent on the resident engineer's written order.

Here are some guidelines for administering the specification:

- Whenever the resident engineer orders the pavement or deck of a structure opened to public traffic, the contractor is relieved of responsibility for damage to the completed permanent facilities caused by public traffic. The contractor will be relieved of responsibility whether the opening to public traffic occurs before the scheduled opening time, occurs as the natural sequence of events, or occurs as the result of a contract specification. The contractor will be relieved of responsibility for damage to completed permanent facilities caused by public traffic whether traffic is placed on new alignment not previously used by traffic or new resurfacing opened after daily closures. Compensation for damage caused by public traffic is appropriate if the completed surfacing consists of an asphalt concrete base or leveling course.

- If the contractor requests an opening ahead of the normal schedule, the following applies:

    1. When the opening does not conform to the specified order of work, it must be covered by a contract change order approved by headquarters, in accordance with Section 5-3, "Contract Change Orders," of this manual. If Caltrans will not compensate the contractor for damage to completed permanent facilities, the contract change order must state this fact.

    2. When the opening does not conform to the specified order of work, the resident engineer will normally base approval or disapproval of the contract change order on an evaluation of the benefit to public traffic. If the benefit is substantial, it is appropriate to approve the contract change order and compensation in accordance with Section 7-1.08, "Public Convenience," of the *Standard Specifications*. If measurable benefits accrue to the contractor, ensure the contract change order provides a credit to Caltrans.

    3. If the benefits to public traffic are borderline or negligible, it is appropriate to approve the contract change order under the condition that the contractor be responsible for damage caused by public traffic. The contractor must acknowledge the condition in writing. Again, if measurable benefits accrue to the contractor, include a credit to Caltrans in the contract change order.

    4. If good reason exists for doing so, the resident engineer can refuse to approve a proposed opening.

- Except as provided for in Section 7-1.15, "Relief From Maintenance and Responsibility," of the *Standard Specifications*, Caltrans will not relieve the contractor from responsibility for damage to completed permanent facilities if the contractor never does the following:

    1. Moves public traffic from the existing traveled way.

    2. Places public traffic on new pavement.

- When the contractor temporarily routes public traffic closer to the facilities than the traffic will be after completion of the work, the contractor will be relieved of responsibility for damage to the completed permanent facilities caused by public traffic. For example, Caltrans will relieve the contractor of responsibility if damage occurs to a completed guardrail at the edge of the shoulder when public traffic is temporarily placed on the shoulder to facilitate construction.

3-704E Maintenance Within Construction Limits

If the highway in question is a state highway, Caltrans' maintenance forces must maintain the highway as a maintenance expense. A clear understanding must exist between the maintenance area supervisor or area superintendent and the resident engineer about which portions of the highway Caltrans' maintenance forces will continue to maintain during the project's construction. The following guidelines should be used when discussing roadway maintenance:

- If new work is required along an existing highway, the owner (Caltrans or the local authority) will continue to maintain the highway, or portions of it, until the contractor takes possession by erecting signs or begins contract item work. The owner will resume maintaining the highway or portions of it when the contractor is relieved from maintenance responsibility, as provided for in Section 7-1.15, "Relief of Maintenance and Responsibility," of the *Standard Specifications*.
- Often, on widening or improvement projects, existing highway facilities will be located outside of the actual areas of work where alterations, modifications, or replacements are not planned. In these cases, except for repair of damage due to the contractor's operations, the owner will maintain the highway. If the new work consists of widening the existing highway's pavement or roadbed and the contractor's operations are restricted to a portion of the width of the roadway, the owner will continue maintaining the balance of the width.
- If damages caused by the public occurs to any existing facility within the construction limits, and the work required to repair the damage is similar to the work being done by the contractor, it is preferable to have the repairs done by the contractor.
- In case of emergency conditions within construction limits the maintenance area supervisor and the resident engineer should determine who should respond so that the condition is addressed in the quickest and safest manner.
- Pay as extra work any work the contractor does to maintain and repair damage to existing facilities (except for damage caused by the contractor).

3-705 Public Safety

3-705 Public Safety

The contract must bear all expenses associated with those devices primarily intended to protect traffic from hazards arising because of the contractor's operations. Typical items classified as public safety devices include barricades, signs, and lights placed to guard the public against damage. The contractor must protect traffic from falling rocks, falling trees, collision with equipment (whether idle or in operation), open trenches, and other excavations.

Some of the factors affecting public safety include the disposition, placement, movements, and actions of workers and equipment, and the placement and handling of materials.

Under the specifications, the engineer can point out the contractor's failure to carry out any of the specification requirements. The specifications do not relieve the contractor of the cost of protecting the public simply because the engineer has or has not called attention to an unsafe situation.

3-705A Clearance and Bridge Permit Rating Changes (Temporary)

The following guidelines apply to situations where temporary changes exist in vertical or horizontal clearance for vehicular traffic or where temporary changes exist in bridge permit ratings.

3-705A (1) Temporary Vertical and Horizontal Clearance Changes

Fifteen days before implementing proposed vertical and horizontal clearance changes, the resident engineer must notify the Transportation Permits Branch by fax of the proposed changes and their duration. (Note: Whenever the operation will reduce clearances available to public traffic, the specifications require the contractor to notify the resident engineer at least 15 days before the anticipated start of each falsework and girder erection operation.) If the clearance change is on a local jurisdiction roadway, notify the affected agency in writing at the same time.

3-705A (2) Temporary Bridge Permit Rating Changes

Fifteen days before implementing proposed bridge permit rating changes, the structure representative must notify the resident engineer in writing and the bridge rating engineer by fax of the proposed ratings and their duration. The bridge rating engineer must then immediately notify the Transportation Permits Branch of any rating changes.

Within three days of the removal of the temporary bridge permit rating, the structure representative must notify the resident engineer in writing and the bridge rating engineer by fax. The bridge rating engineer must then immediately notify the Transportation Permits Branch.

3-705B Clearance and Bridge Permit Rating Changes (Permanent)

The following guidelines apply to situations where permanent changes exist in vertical or horizontal clearance for vehicular traffic or where permanent changes exist in bridge permit ratings.

3-705B (1) Permanent Vertical and Horizontal Clearance Changes

Fifteen days before implementing proposed permanent vertical and horizontal clearance changes, the resident engineer must notify the Transportation Permits Branch by fax of the proposed changes. Also, to confirm the necessary information, the resident engineer must consult the Transportation Permits Branch before actual field measurements.

3-705B (2) Permanent Bridge Permit Rating Changes

Fifteen days before implementing the proposed bridge permit rating changes, the structure representative must notify the resident engineer in writing and the bridge rating engineer by fax of the proposed bridge permit ratings. The bridge rating engineer must then immediately notify the Transportation Permits Branch of any rating changes.

3-705B (3) Notification Procedure

Submit changes to be reported in accordance with the above procedures to either the North Region or South Region construction/maintenance liaison in the Transportation Permits Branch. The North Region liaison is responsible for districts 1, 2, 3, 4, 5 (except San Luis Obispo and Santa Barbara Counties), 6 (except Kern County), and 10. The South Region liaison is responsible for districts 5 (San Luis Obispo and Santa Barbara Counties only), 6 (Kern County only), 7, 8, 9, 11, and 12.

To submit changes, use the following forms, maintained by the Office of Traffic Safety Program and Research:

- Form TR-0019, "Notice of Change in Clearance or Bridge Weight Rating"
- Form TR-0020, "Notice in Change in Vertical or Horizontal Clearance"
- Form TR-0029 "Notice of Change in Clearance or Bridge Weight Rating"

The Transportation Permits Branch will, within one business day, send a fax to the resident engineer confirming receipt of the change.

3-706 Preservation of Property

3-706 Preservation of Property

The contract makes the contractor responsible for the preservation of all property involved in the project, including that which is not in sight. It is in the best interests of all parties for the engineer to be diligent in determining and pointing out the existence of all such property of which Caltrans has knowledge, especially that which is not in sight. For information about locating and protecting underground utilities, see Section 3-809, "Utility and Non-Highway Facilities," of this manual.

The plans and specifications may require that certain trees, shrubs, and other vegetation be preserved. The resident engineer must ensure the contractor is aware of all plant life to be saved.

The resident engineer must also ensure the contractor does all that is required under the contract to protect and preserve property. However, the contractor's responsibility includes only that which is necessary to protect against damage by the construction activity. If any permanent protection is ordered, such as rubble tree wells in the planned slope, pay for this work as you would for any other ordered additional work.

3-707 Indemnification and Insurance

3-707 Indemnification and Insurance

The following are guidelines for enforcing and administering the requirements in the *Standard Specifications* for contractors' insurance and for railroad insurance as required by the special provisions.

3-707A Evidence of Insurance

At or before the preconstruction conference, the contractor must provide the resident engineer with evidence of insurance, as required by Section 7-1.12B, "Insurance," of the *Standard Specifications*. The resident engineer must do the following:

- Ensure the evidence of insurance conforms to the specified requirements.
- Forward a copy of the evidence of insurance to the Division of Construction, Progress Payment Section.
- Ensure the contractor's required insurance does not lapse during the life of the project.

- If the contractor fails to maintain insurance coverage, request the contractor to immediately obtain the necessary coverage. If the contractor fails to do so, the resident engineer may consider contacting the insurance carrier to make arrangements to maintain the required coverage and charge the expense to the contractor.
- If the above procedures do not result in obtaining coverage, contact the Division of Construction for guidance.

3-707B Railroad Insurance

State highway construction occasionally requires that a contractor's operations be performed on or near a railroad's operating properties. This proximity varies from minor side encroachments to work involving the direct crossing of a railroad's tracks. Section 13, "Railroad Relations and Insurance Requirements," of the special provisions defines the relationships between Caltrans, the contractor, and the railroad.

When work must be performed on or near a railroad's operating properties, the contractor must provide insurance to ensure the financial ability to meet legal liability for damage, and to cover the losses that a railroad might sustain because of the contractor's operations.

Although contract specifications regarding railroad insurance have been standardized, occasional changes occur because of special situations. Requirements for railroad protective liability insurance vary depending on the railroad company involved. In Section 13 of the special provisions, the Engineering Services, Railroad Agreements Branch will normally issue special instructions for irregular situations.

3-707B (1) Insurance Approvals

Deliver all railroad insurance policies and copies provided to cover the prime contractor in accordance with Section 13 of the special provisions. Allow a minimum of four weeks for the railroad's notice of approval of the insurance. In cases of emergencies, you can obtain verbal release and authority to start work after the railroad has received all the documents.

3-707B (2) Responsibility

The resident engineer must ensure the specified insurance is in force at all times when work is being performed that requires such insurance.

Prohibit work that involves encroachment on railroad property, either by a prime contractor or a subcontractor, until the following conditions have been met:

- The railroad or the Engineering Services, Railroad Agreements Branch, has advised the resident engineer that the contractor, subcontractor, or both, have furnished the specified insurance.
- The resident engineer has a copy of the certificate of insurance.

3-707B (3) Insurance Renewal

Approximately four weeks before the expiration date of an insurance certificate furnished by either a contractor or subcontractor, the resident engineer must notify the contractor, by letter, of the expiration date. If work is to continue on railroad property, request the contractor to obtain renewal insurance. At that time, determine whether work on the railroad property has been completed.

Renewals may be accomplished by endorsing the extension of existing certificates or by issuing new certificates.

Allow sufficient time for railroad approval after the submission of a new railroad protective policy.

3-708 Disposal of Material Outside the Highway Right-of-Way

3-708 Disposal of Material Outside the Highway Right-of-Way

Do not allow the contractor to dispose of material outside the right-of-way until the contractor has met all the requirements in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the *Standard Specifications*. When these requirements have been met, give the contractor written permission for disposal sites not covered by an agreement between the property owner and Caltrans.

In the case of disposal of material on a property outside the highway right-of-way that is covered by an agreement between the property owner and Caltrans, the resident engineer must prepare the specified document to be executed by the contractor. Use agreements similar to those shown in Section 3-607, "Local Materials," of this manual, with wording modified to indicate disposal sites.

Approval of the disposal of materials outside the highway right-of-way guards against disposal that would harm the highway or cause environmental damage, disposal site damage, or unsightliness.

3-709 Relief From Maintenance and Responsibility

3-709 Relief From Maintenance and Responsibility

Under conditions specified in Section 7-1.15, "Relief From Maintenance and Responsibility," of the *Standard Specifications*, the contractor may be relieved from maintaining and protecting certain completed portions or sections of the work.

Caltrans policy recommends relief only for those portions of the work specifically mentioned in the specifications unless exceptions are fully justified in the request for relief.

For completed roadways, the specified length of 0.5 km is the minimum practical length of completed main roadway upon which a recommendation can be made for relief from maintenance and responsibility. However, shorter units of completed work, such as on-ramps, off-ramps, frontage roads, or approaches to undercrossings and overcrossings, may also be eligible for relief from maintenance and responsibility. Do not recommend relief from maintenance and responsibility on 0.5 km sections that contain exceptions within that length unless you provide a valid reason presented with and supporting the recommendation.

Exceptions, if any, must be defined by longitudinal sections of highway or certain specified areas. For example, it is unacceptable to recommend relief from maintenance for a total project except for the inlet ditch to the right of stations 20 to 25. It is acceptable to recommend relief for the total project except for stations 15 to 27 (the section of highway that could be affected by the uncompleted ditch to the right of stations 20 to 25).

The following describes what constitutes a "bridge or other structure of major importance":

- For purposes of relief from maintenance and responsibility, a bridge is as defined in Section 1, "Definitions and Terms," of the *Standard Specifications*. A structure will be considered a bridge if it is so identified in the plans or other portions of the contract.

- Other structures that are to be considered of major importance are culverts in excess of 2000 mm in diameter or of approximate equivalent area.
- A facility not meeting the above criteria will be considered of major importance only if its final cost exceeds 5 percent of the original total bid for contract items (including mobilization).

  Projects with noncontiguous locations may be accepted location by location provided the work at each requested location is completed in all aspects. Noncontiguous areas of work outside of the right-of-way on major projects may also be accepted, provided that the procedures outlined in Section 3-513A, "Work for Other Agencies or Owners," of this manual have been followed.

Relief from maintenance and responsibility relieves the contractor of responsibility for repair of damage from the elements. Before recommending any request for relief from maintenance and responsibility, determine that the requested work will not be damaged as a result of incomplete adjoining work. For instance, a roadway section may be complete while an upstream culvert remains incomplete. Water flowing past the uncompleted culvert may damage a portion of the requested roadway section.

Before recommending relief from maintenance and responsibility, analyze each situation critically to determine if it qualifies in all respects. The project's proper completion must not be jeopardized by indiscriminate recommendations for relief from maintenance and responsibility. Once the contractor is relieved from maintaining and protecting a portion of the work, the contractor cannot be required to do more work on it except by agreement or to remedy defective work or materials.

If you have any doubts about the requested area's eligibility, deny the contractor's request for relief from maintenance and responsibility. Inform the contractor in writing so no doubt exists as to the status of the contractor's request and the nature of uncompleted work. The *Standard Specifications* clearly state that the portion of work must be complete in all respects before it becomes eligible for relief from maintenance and responsibility.

For landscape projects, a special provision is usually included to allow the granting of relief from maintenance and responsibility for items not directly connected with plant establishment work or highway planting and irrigation systems. Under the special provision, relief from maintenance and responsibility could be granted for typical items of work such as asphalt concrete placed as island paving or sidewalks and seal coats placed on islands, curbs, and fences. In many cases, these items would not have a direct bearing on the success or failure of plant establishment, and it is unreasonable to require the contractor to maintain these items.

However, to be consistent with the policy for non-landscape contracts, this type of relief from maintenance and responsibility will not be granted item by item, but only for an entire group of items. Any item that protects the planting or is involved in plant establishment should not be submitted for relief from maintenance and responsibility. Items typical of this category include planter boxes, sprinkler systems, header boards, or mesh.

Roadside rests will not be accepted item by item, but they may be recommended as completed units.

Relief from maintenance and responsibility denotes recognition of work that is completed. Therefore, any recommendations for this action on work for other public agencies or owners also require the concurrence of these agencies and owners. Before recommending relief from maintenance and responsibility on such portions of the work, complete the procedures outlined in Section 3-513A, "Work for Other Agencies

or Owners," of this manual. In the communication recommending relief, include a statement that the agency authorities concur, or in the absence of such concurrence, include a justification for relief.

For requests for relief from maintenance and responsibility, use Form CEM-0501, "Relief from Maintenance."

The resident engineer must conduct a maintenance review of areas for which relief from maintenance and responsibility is to be granted. For guidelines on maintenance reviews, see Section 3-5, "Control of Work," of this manual.

3-710 Acceptance of Contract

3-710 Acceptance of Contract

On the day that project work is completed in accordance with all the requirements of the *Standard Specifications*, special provisions, plans, and approved contract change orders, send to the district construction office a fax recommending acceptance of the contract by the district.

For recommendations of acceptance, use Form CEM-6301, "Contract Acceptance."

Follow the same procedure for the acceptance of emergency contracts.

3-711 Rights in Land and Improvements

3-711 Rights in Land and Improvements

Generally, the contractor may use the right-of-way for purposes that are reasonably necessary to perform the required work. The contractor has no right to make use of the property, or to allow others to make use of it, when such use is not reasonably necessary to perform the required work. For example, residency trailers must not be placed within the right-of-way although one trailer may be allowed for yard security purposes. Prohibit any use of a Caltrans right-of-way that conflicts with the above requirement. Discuss unusual or complicated situations with the construction field coordinator.

As stated in Section 7-1.19, "Rights in Land and Improvements," of the *Standard Specifications*, the contractor may enter into a rental agreement to use state-owned property outside the right-of-way.

3-711A Nonoperating Right-of-Way (Airspace)

Usable property under bridges or viaducts or other property that cannot be sold as excess, but can be leased, has been classified as nonoperating right-of-way (also known as "airspace"). Each district involved with the development of such property has established an inventory. The special provisions will normally cover the use, or prohibition against use, of nonoperating right-of-way by the contractor. On those occasions when the use of an airspace parcel is not part of the contract and a contractor later requests such use, the contractor must negotiate a lease for the parcel. A standard form is used for the lease and calls for payment based on fair market value. No special consideration will be given because the lessee is performing Caltrans work. Also, all of the normal provisions requiring insurance and parcel protection will be enforced.

Section 8 Prosecution and Progress

3-801 Subcontracting

3-802 Beginning of Work

3-803 Progress Schedule

3-804 Temporary Suspension of Work

3-805 Time of Completion

- Determine whether the contractor diligently tried to obtain the material.

  Require the contractor to furnish documented proof of dates that material was ordered and confirmed. The orders must have been placed sufficiently in advance of the desired delivery to cover a normal lapse time in the particular industry. However, you cannot expect the contractor to have placed orders before contract approval.

  If the contractor's order was timely, request documented proof of efforts to obtain material from those alternate sources normally supplying such materials to projects in the area. Alternate sources include, when possible, production of an item using the contractor's own forces.

  If written proof is unavailable from an alternate source, the resident engineer may accept a verbal confirmation from a supplier. Record such confirmation in the daily report and in the letter to the district recommending the time extension. When no alternate source exists, or when procurement from an alternate source may delay delivery even longer than procurement from the original source, also record confirmation of this situation.

  For information on approving a time extension because of a shortage of material, see section 3-805A (2), "Time Extension," of this manual. The time extension days will generally be recorded as "other days."

3-807 Termination of Control

3-807 Termination of Control

Section 8-1.08, "Termination of Control," of the *Standard Specifications* explains the contractual requirements for terminating the contractor's control. Sections 10253 through 10260 of the Public Contract Code covers defaulted contracts.

Termination of control may occur when a contractor fails to supply an adequate work force, fails to supply material of proper quality, fails to make proper and timely payments to subcontractors, or fails in any other respect to prosecute the work with the diligence and force specified by the contract. The following are guidelines for determining if the contractor may be failing to supply an adequate workforce:

- If the "percent completed" of the contract is more than 25 percent behind the "percent time elapsed." These percentages can be found in the project status report. Normally, when Caltrans terminates the contractor's control, the surety (bonding company) assumes responsibility for completing the contract.
- Complete cessation of the work.
- The working has not started within a period equal to 10 percent of the original working days or 50 working days, whichever is less.

If the resident engineer suspects termination may be necessary, the resident engineer must immediately notify the construction engineer.

With agreement from the construction engineer, the senior structure engineer (if applicable), and the construction field coordinator, the resident engineer sends a letter to the contractor that describes the defaults to be remedied. The letter also specifies the amount of time allowed to remedy the defaults and states that, in accordance with Section 8-1.08, "Termination of Control," of the *Standard Specifications,* Caltrans will start the termination process if the defaults are not remedied. A copy of this letter is sent to the contractor's surety. Typically, Caltrans allows five days to remedy either failure to supply an adequate work force or failure to supply proper quality material. Typically, 15 days are allowed to remedy failure to pay subcontractors.

If the contractor fails to promptly remedy the defaults outlined in the resident engineer's letter, the district construction deputy director will send a request to the Division of Construction chief to start the termination process. The request must include the following:

- The defaults to be remedied
- Current status of the contract, including dates the contractor last performed work
- Any other information considered pertinent

To determine what action is necessary, the Division of Construction chief may call a conference with the contractor's representatives, its surety, the construction field coordinator, and the district.

If terminating the contractor's control is necessary, the Division of Construction chief will send a letter to the contractor, with a copy to the surety, notifying the contractor that it has five days to remedy the defaults or Caltrans will terminate the contractor's control of the work. The contractor and surety will be responsible for any costs Caltrans incurs to complete the work.

If available, the contractor must be personally served with the five-day notice letter. If both the contractor and its representative are unavailable and their addresses are known, send the letter by registered mail. If both the contractor and its representative cannot be located and their addresses are unknown, post the five-day notice letter in the most conspicuous place within the project limits. If the contractor does not remedy the defaults within the five days, the Division of Construction chief will send a letter to the contractor notifying the contractor that its control of the work has been terminated. The construction field coordinator will notify the district of the effective starting date of the notice and will transmit any further instructions deemed necessary.

All five-day notices and termination of control letters must include the following language:

> Your default may subject you to a review of your responsibility to perform future work with Caltrans.

Once the contractor's control has been terminated, the construction field coordinator must notify the Division of Construction's progress payment coordinator by forwarding a copy of the termination letter. Using information from the termination letter, the progress payment coordinator will update the termination database and keep this information in the database for 36 months. The progress payment coordinator will also send a written request to the resident engineer requesting copies of all correspondence and daily report information related to the termination.

The Division of Construction chief will send a letter to the surety requesting the surety to fulfill its obligations under the bond to complete the work with other forces. Because it is typically preferred that the surety proceed with the contractual work, the resident engineer should assist the surety in its efforts to complete the work. The resident engineer will determine and resolve with the surety the precise quantities and costs necessary to complete the work.

The following two sections describe the process to complete the contract after the contractor's control has been terminated.

To initiate contract termination, the district director must write a letter to the Division of Construction chief, stating the reasons for requesting the termination. The letter should include the following information:

- Reasons for the termination
- Work performed
- Work yet to be performed
- Any information pertaining to the advertisement date of the new contract

If the Division Construction chief concurs, the Division of Construction will prepare a letter to the deputy director of Project Delivery to reiterate the relevant points from the district's letter and recommend approval for terminating the contract.

If appropriate, the deputy director of Project Delivery approves the termination. Upon approval, the Division of Construction chief will issue a letter to the contractor, signed by the deputy director, notifying the contractor that Caltrans will terminate the contract as soon as any work the resident engineer requested is complete. When all work is complete, the district must accept the project.

The contractor will be paid all reasonable costs as computed according to Section 8-1.11, "Termination of Contract," of the *Standard Specifications*. An audit of the contractor's cost records is normally required to resolve compensation issues. After contract acceptance, payments can be made in accordance with Section 9-1.07B, "Final Payment and Claims," of the *Standard Specifications*.

3-810A Federal-Aid Contracts on the National Highway System

For full oversight and state-authorized federal-aid contracts on the National Highway System, the resident engineer or construction engineer must contact the Division of Construction's field coordinator to obtain concurrence from the Federal Highway Administration's engineer on the termination of a contract. Refer to the Code of Federal Regulations, Title 23, Part 635 (23CFR 635.125). For additional information, refer to the *Construction Coordinator's Termination Desk Guide* on the Division of Construction's Intranet web site.

Maps of the National Highway System may be accessed on the following Federal Highway Administration web site: http://www.fhwa.dot.gov/hep10/nhs/index.html.

Section 12 Construction Area Traffic Control Devices

Section 12
Contruction Area
Traffic Control
Devices

4-1201 General

4-1201
General

This section provides guidelines for inspecting traffic control devices in construction areas. Section 2-2, "Traffic," of the *Construction Manual* (manual) provides guidelines and a general overview about providing a safe and convenient passage of public traffic through the construction area. Section 2-2 and this section complement each other. Engineers who administer the provisions in Section 12, "Construction Area Traffic Control Devices," of the *Standard Specifications*, must be familiar with both Section 2-2 and this section of the manual.

Engineers administering traffic control must also be familiar with the current *Manual on Uniform Traffic Control Devices (MUTCD)* and *MUTCD California Supplement.* If a discrepancy occurs between the contract plans and specifications and the *MUTCD* and *MUTCD CA Supplement*, the plans and specifications govern.

4-1202 Before Work Begins

4-1202
Before Work Begins

Take the following general steps before work begins:

- To obtain a thorough understanding of the project's traffic control needs and requirements, review the plans, special provisions, *Standard Specifications*, and *Standard Plans*.
- Determine what signs must be placed before work begins for the entire project and before work begins for each stage of the project.
- Determine the methods and equipment the contractor will use for closing lanes, ramps, and roadways, and for flagging and controlling one-way traffic.
- Note the various traffic control devices specified to be used. Some of these devices will require certificates of compliance. Signage and delineation materials listed in the special provisions must be listed in the Caltrans list of approved traffic products and must be covered by certificates of compliance. The resident engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.
- Visually inspect all traffic control devices to ensure conformity with the specifications. If you approve the devices for use, record the approval in the daily reports.

4-1202A Flagging

Discuss any flagging operation with the contractor before the operation begins. Ensure flaggers are trained in accordance with the *MUTCD* and *MUTCD CA Supplement* and the *Construction Safety Orders*. Review with the contractor how flaggers will communicate with each other, with pilot cars, and with workers inside the controlled area. Develop a plan for handling emergencies and emergency vehicles in the control zone.

4-1202B Barricades

Verify barricade construction complies with Section 12-3.02, "Barricades," of the *Standard Specifications* and with Sheet A-73C of the *Standard Plans* . Reflective sheeting requires a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202C Flashing Arrow Signs

Verify Type I and Type II flashing arrow signs comply with Section 12-3.03, "Flashing Arrow Signs," of the *Standard Specifications*.

4-1202D Portable Delineators

Before initial placement, verify that the type the contractor proposes conforms to requirements in Section 12-3.04, "Portable Delineators," of the *Standard Specifications*. Portable delineators require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202E Portable Flashing Beacons

Verify portable flashing beacons conform to requirements in Section 12-3.05, "Portable Flashing Beacons," of the *Standard Specifications*.

4-1202F Construction Area Signs

At the preconstruction conference, remind the contractor of the following:

- The contractor must maintain an inventory of commonly required items at the job site and arrange for sign panels, posts, and mounting hardware or portable sign mounts to be furnished on short notice.
- The special provisions list requirements for signage materials. Substrate and reflective sheeting for construction area signs require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.
- Before digging to install signposts, regional notification centers must be notified. Hand digging is required unless the location is free of underground utilities.

4-1202G Channelizers

For requirements for channelizers, review the plans, special provisions, and Section 12-3.07, "Channelizers," of the *Standard Specifications*. Channelizers require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202H Temporary Railing (Type K)

Determine if temporary railing (Type K) is to be cast on the project. For temporary railing (Type K) cast off the project, a Certificate of Compliance is required.

Determine if temporary railing (Type K) is to be placed within 3 m of a traffic lane. The contractor must provide reflectors and adhesive, as noted in Section 12-3.08, "Temporary Railing (Type K)," of the *Standard Specifications*.

Freshly painted temporary railing (Type K) is required only before its first use on the project unless the special provisions require otherwise.

Reflectors for temporary railing (Type K) require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202I Traffic Cones

Verify traffic cones comply with Section 12-3.10, "Traffic Cones," of the *Standard Specifications*. If the contractor plans to use cones for night work, determine the type of cone proposed. Removable reflective sleeves must be removed during daylight. Allow use of only one type of retroreflective cone. Reflective sleeves require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202J Portable Changeable Message Signs

Before the first deployment of portable changeable message signs, arrange with the contractor to have them inspected. Perform field tests to verify compliance with Section 12-3.12, "Portable Changeable Message Signs," of the *Standard Specifications*. Conduct these inspections and tests in conditions similar to those in which they will be used on the project, specifically, during the night or during the day.

Verify that the trailer can be leveled and that the sign operates within the required minimum and maximum heights.

4-1202K Temporary Crash Cushion Module

Review the project plans and sheets T1A, T1B, and T2 of the *Standard Plans*. Frequently the plans for stage construction, detour or traffic handling will require arrays of temporary crash cushion modules. Changes to any of these plans may alter the need for temporary crash cushion modules.

If installing temporary railing (Type K) creates a blunt-end exposure within 4.6 m of the edge of the traveled way, temporary crash cushions are required at that location.

The *Standard Plans* require that temporary crash cushions be installed on wooden pallets. The maximum acceptable pallet height is 115 mm. Pallets that exceed this height raise the sand in the crash cushions above an acceptable level. Do not use typical commercial pallets that exceed the allowed height.

Visually inspect crash cushion modules to ensure they conform to the requirements in the special provisions.

4-1202L Temporary Traffic Screen

For requirements for temporary traffic screen, review the special provisions and Sheet T4 of the *Standard Plans.*

4-1202M Temporary Signal System

As early as possible, verify that all state-furnished equipment is available at the location specified in the special provisions. If the equipment is not available, make other arrangements as soon as possible.

Verify that the actual visibility in the field meets the expected visibility. If sight distance is not adequate, contact the district traffic engineer for suggestions or recommendations.

Remote area signal installations are often located in forests or grasslands. Ensure all fire safety requirements are in place and operative before using the system. Checking fire safety requirements will often involve working with personnel from the local U.S. Forest Service, Bureau of Land Management, or California Department of Forestry.

4-1202N Traffic Plastic Drums

Before initial placement, verify the type that the contractor proposes complies with specified requirements. Reflective sheeting used on traffic plastic drums requires a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202O Traffic Control System

- Before work begins, carefully review the plans, specifications, and sheets T10 through T17 of the *Standard Plans*. It is important to know in advance what personnel, signage, and equipment will be required to implement the traffic control system. Before using any traffic control system, ensure that all the components are on hand and have met all specified requirements.

  Refer to "Cooperation" , if applicable, in the special provisions. Frequently a project is one of many in the same vicinity or in the same transportation corridor. In such instances, require that the various contractors coordinate their efforts by submitting in advance their schedules for lane closures and resolving schedule conflicts before any closures are implemented. Review these requirements with the contractors before work starts. Remove or cover any construction area signs that duplicate or contradict the signs for a project within 800 m of another project.

- In the contractor's or subcontractor's yard, if possible before the first use, inspect the signs and equipment the contractor proposes to use. Verify that all the necessary signs, cones, drums, and other equipment are on hand before setting up the system for the first time. If the proposed materials have already been used, check them for acceptability. Replace any unacceptable equipment. It is much easier to correct deficiencies before the system is installed.

- If the contractor is to place the traffic control system repeatedly in the same place, mark on the shoulder or pavement the locations of advance signs, cones, and drums. This will speed the placing of lane closures and ensure better taper alignment.

4-1203 During the Course of Work

4-1203 During the Course of Work

Contractors should maintain all traffic control devices in good working order throughout the project's life. During operations requiring traffic control systems, engineers should ensure that all traffic control devices are correctly located and functioning properly.

4-1203A Flagging

Observe the flagging operation to ensure that the flaggers are using correct procedures for directing motorists. Also, ensure that flagging stations are laid out correctly, are visible to approaching traffic, and have correct advance warning signs. The contractor's flaggers must be properly trained and equipped and must perform their duties in accordance with the *Manual on Uniform Traffic Control Devices (MUTCD)* and *MUTCD California Supplement*. When pilot vehicles are used, radios are required.

the special provisions. Any change in the specified pesticides must be made by a contract change order.

- Some counties have environmentally sensitive areas where special requirements or prohibitions may apply. Consider any restrictions imposed by county agricultural commissioners.
- Ensure the proposed application rates or other features will not cause damage to abutting properties or to existing plants that must remain. Do not approve harmful pesticides that can be carried to other locations by runoff during the rainy season.
- Upon completion of the necessary reviews, advise the contractor in writing that the pest control adviser's recommendations have been approved subject to the provisions of Section 7-1.01H, "Use of Pesticides," of the *Standard Specifications*.

4-2003B (2) Plants

Before any work with plants begins, the resident engineer must do the following:

- Discuss the requirements for plants with the contractor and ask if the contractor wants the inspection of plants to occur before shipping. Ensure the contractor understands that the plants will still be subject to inspection at the job site.
- When requested by the contractor, you may arrange to inspect the plants at the plant supplier's nursery. For inspection of the plants at a nursery in another district, request assistance from a qualified person in the district where the nursery is located. Send all necessary contract information to the plant inspector.
- The inspection should be done after the contractor submits the required 10-day notice of the plant shipping date. The plant inspector must document the results of the inspection, including rejection of any plants and the reasons for rejection. The inspector must send the report to the resident engineer. However, plants that have been examined at the nursery are still subject to inspection at the job site. Inspect plants for compliance with Section 20-2.13, "Plants," of the *Standard Specifications*, and with any special provisions. The following are guidelines for plant inspection.

  1. Examine the plants and their nametags to confirm the plants are of the variety and size specified.
  2. Observe the methods of transporting and storing the plants. Pay particular attention to the requirements for keeping plants wet. Reject plants that are dry, wilted, or otherwise unsuitable when delivered to the planting area. Note such rejection in the daily report.
  3. Check to see if plants are obviously deformed, diseased, or insect infested. Obtain inspection certificates that indicate all plants comply with federal and state laws requiring inspection for diseases and infestations. Before accepting plants from another county, require the contractor to produce evidence of clearance from the county agricultural commissioner.
  4. For the specified number of plants, remove earth from the roots of container-grown plants to determine the condition of the roots. Ensure enough roots have grown so that the dirt and root ball will hold together when planting.

5. Do not accept root bound plants. See Figure 4-20.1 “Roots,” for an example of acceptable and non-acceptable roots. After a root bound plant is planted, water cannot penetrate the tight mass of roots, or at maturity, the plant may strangle itself. Root bound plants occur when seedlings are grown too long in small containers. The roots grow to the bottom of the container and then turn and grow around the ball of the plant. It is difficult to overcome a root bound condition merely by planting into a larger container or into the ground.

Figure 4-20.1 Roots

Good Roots

Acceptable

Pot Bound Roots

Not Acceptable

6. Check for root girdling in plants that have a main taproot. Girdling occurs when a plant has been left in a container for too long. The taproot circles and chokes the root system until the plant eventually dies.

7. Ensure plants in larger containers have not recently been transplanted from a smaller container. Plants should be well rooted in proportion to the container from which they are taken.

8. Make random measurements of carpobrotus cuttings to ensure the cuttings equal the specified length.

Section 39 Asphalt Concrete

Section 39
Asphalt Concrete

4-3901 General

4-3901
General

Producing a specified asphalt concrete pavement is complex, normally requiring various Caltrans employees working as a team to accomplish the desired result. The resident engineer must clearly communicate assignments of responsibility (and commensurate authority) for all personnel and also ensure adequate communication among personnel at the job site and personnel at the plant.

At the mixing plant, plant inspection specialists and acceptance testers who are not directly assigned to the resident engineer usually perform inspection and testing duties. However, the resident engineer is as responsible for enforcing the specifications at the plant as at the job site. Thus, the resident engineer must ensure contract compliance at the mixing plant as well as on-site. Good communication is essential between plant inspection specialists and assistant resident engineers. The resident engineer must be kept informed of test results in a timely manner.

The *Manual for Quality Control and Quality Assurance for Asphalt Concrete* covers quality control quality assurance (QCQA) projects. Before these projects begin, the resident engineer should contact the district or the headquarters QCQA coordinator.

4-3902 Before work begins

4-3902
Before work begins

The following guidelines apply to non-QCQA projects. (For QCQA projects, refer to the *Manual for Quality Control and Quality Assurance for Asphalt Concrete.*)

4-3902A General

Perform the following before work begins:

- Verify the receipt and proper distribution of Form CEM-3101, “Notice of Materials to Be Used,” which covers materials to be used for asphalt concrete paving.
- Determine if the contractor intends to use an optional tapered notched wedge device to install a tapered longitudinal joint between traffic lanes. (Refer to Sheet P70 of the *Standard Plans* for the use requirements).
- Contact the Office of Materials Engineering and Testing Services (METS) for technical support if the tapered notched wedge device is used.
- To determine the required type of asphalt concrete or asphalt concrete base, review the plans, special provisions, and *Standard Specifications*. Pay particular attention to any special requirements and to the type of asphalt binder specified.
- Decide whether field conditions (such as climate or types or sources of material) require any changes in the specified materials. In making such decisions, consider issues such as the designer’s intent as well as items such as preliminary test reports or previous experience with local sources.
- For information on the uses of various asphalts and the design and production of asphalt concrete, refer to *Principles of Construction of Hot-Mix Asphalt*

Pavements, published by the Asphalt Institute. Personnel responsible for asphalt concrete must familiarize themselves with the information in this manual.

- If changes in the contract are necessary, determine these changes as far in advance of the operation as possible to avoid inconvenience and extra expense. Such changes must be covered by a contract change order.
- Determine whether automatic batching will be required for the contract in question. Automatic batching is required for most asphalt concrete projects and is always required for QCQA projects.
- Review the contract's measurement and payment clauses, and decide what records must be kept.
- With plant inspection staff and assistant resident engineers, review Form CEM-3501, "AC Production/Placement Checklist," and determine how often the form will be used.
- In the interest of economy, determine whether the plants from which the asphalt will be obtained are presently producing material under the same specifications for another Caltrans project. If so, decide whether you can waive initial sampling and testing. Note such a decision in the daily report, and notify the contractor in writing.

4-3902B Initial Sampling and Testing

Before work begins, take the following steps related to initial sampling and testing:

- For mix design and to determine other specified attributes, obtain samples of aggregates. The sizes of the samples are shown in the tables in Section 6-1, "Sample Types and Frequencies," of the *Construction Manual (manual)*.
- The contractor must furnish the aggregate gradation for each mix to be used on the project. Also, the contractor must furnish samples of processed aggregates, which will undergo testing to ensure compliance with specifications and to permit completion of the mix design. If the contractor changes the source of aggregate, new samples, gradings, and proportions must be furnished. When asphalt concrete will be produced from established sources, the resident engineer may allow the contractor to use the same source, gradings, and proportions as those approved for, and used on, another project. In this case samples are not required.
- Ship the samples to the district materials laboratory, where they will be processed according to the instructions you must include on Form TL-0101, "Sample Identification Card." Your objective is to ensure the laboratory specifies the asphalt content percent that will be maintained during asphalt production.
- When you propose to use an asphalt binder other than the one specified, advise the district materials laboratory so that the laboratory will base the design on the binder to be used.

4-3902C Design of Mixes

Before work begins, take the following steps related to the design of mixes:

- The district materials laboratory designs asphalt concrete mixes based on initial samples. As the sampler, you must advise laboratory personnel (usually through your notes on Form TL-101, "Sample Identification Card") of exactly what a sample must undergo. In addition, your notes will help to inform construction

personnel what the laboratory did to evaluate an initial mix design for the asphalt concrete.

- Without specific instructions, the district materials laboratory will design a mix based on a smooth grading curve located near the center of the grading envelope. In completing the mix design, request the laboratory to use the combined grading furnished by the contractor.
- For details about mix design, refer to *Principles of Construction of Hot-Mix Asphalt Pavements*.

4-3902D Plant Operations

Before production, check the following specified attributes of the asphalt plant:

- Ensure that storage meets specifications by observing the aggregate storage areas and facilities. When specifications require that the various aggregate sizes be stored separately, require physical separation, either by space between stockpiles or by some type of wall that will provide positive separation.
- Determine whether the stockpiled aggregate is similar to material upon which the design was based.
- Check that weighing equipment on the plant meets specifications. Ensure scales and meters are sealed or tested as required. For additional details, see Section 3-90E, "Weighing and Metering Procedures," in this manual. Particularly note the responsibilities of assistant resident engineers (plant inspectors) and the district weights and measures coordinator.
- The district materials laboratory must test and, if appropriate, approve all scales, interlocks, and meters in accordance with California Test 109, "Test for Weighing and Measuring Devices."
- Determine whether the plant has a temperature-sensing device on the drier. The temperature-sensing device will be a recording pyrometer. Temperatures are recorded on paper in graph form or as electronic data.
- The sensing element of the temperature-sensing device should protrude into the main stream of aggregate or the completed mix in the continuous mixing plants. The device should be located where it is not affected by wind, heat reflected from the burner, or other sources of heat.
- To check the accuracy of the temperature-sensing device, insert the device, along with an accurate thermometer, in an asphalt bath that is heated slowly above the temperature range expected of the dried aggregate. Compare the readings of the two instruments. The two readings should match very closely if the temperature-sensing device is to work within the specified tolerance under less than ideal conditions.
- The district weights and measures coordinator will have a standardized thermometer. Check the plant inspector's thermometer against the standardized one.
- Ensure the plant has a functional dust-collection system.
- When the plant uses supplemental fine aggregate or dust collected in baghouses, ensure the plant can store and proportion such material in the specified manner.
- Ensure provisions exist for safely obtaining representative bin samples of the

aggregates, including a means to lower the samples from the sample deck.

- Ensure the asphalt storage tanks are calibrated to meet specifications.
- Ensure asphalt binder is stored in a way that prevents different grades of asphalt from intermingling.
- To maintain the asphalt at the required temperature, ensure all storage tanks, transfer lines, and pumps have heating coils or are jacketed and heated.
- As specified, ensure a sampling outlet valve is installed in the feed line (not in the return line). The valve should be insulated and heated, if necessary, to prevent plugging the valve with cold asphalt.
- Ensure the required asphalt temperature-sensing device is installed in the asphalt feed line as specified.
- Determine if the batch plants have the following additional specified attributes:

  1. Provisions for the binder to be introduced uniformly at the specified location.
  2. A timing device that indicates by an audible or visual signal the end of the mixing period. Ensure the system is in working order and accurate to the specified degree.

- Ask the district weights and measures coordinator or plant specialist for a detailed preproduction inspection and calibration of continuous mix and batch asphalt concrete plants.
- Based on initial samples and tests, provide the contractor with the amount of asphalt binder to be used.

4-3902E Street Operations

Before work begins, take the following steps related to street operations:

- Review "Placing Hot-Mix Asphalt" in the *Principles of Construction of Hot-Mix Asphalt Pavements manual*. This manual covers the many aspects of good paving practice.
- Ensure that subgrade has been prepared as specified. Decide whether asphalt concrete is to be spread over an existing surface to level irregularities. Advise the contractor if leveling is required and also of the method of payment.
- Decide whether prime coat, tack coat (paint binder), or both (including type and grade) should be applied. Base your decision on your judgment and experience. Also consider atmospheric conditions in selecting the material to be applied. Refer to the discussions of prime coat and tack coat (paint binder) in "Placing Hot-Mix Asphalt" in *Principles of Construction of Hot-Mix Asphalt Pavements*.
- When prime coat or tack coat is to be used, advise the contractor of this fact and also of the number of applications, the exact application rate, and how far in advance of the surfacing operation the coat may be placed.
- Ensure asphalt distributor trucks have the specified attributes. For prime coat and paint binder placement guidelines, see Section 4-92, "Asphalts," Section 4-93, "Liquid Asphalts," and Section 4-94, "Asphaltic Emulsions," of this manual.
- Ensure the spreading equipment has the specified attributes. Pay particular attention to pavers that are variable in width, to ensure that spreading and

compacting components (roller, tamper, or other suitable devices) extend for the full width of the traffic lane to be paved. Permit wings, or other spreading devices, only for areas not requiring an asphalt paver, and then only for such widths (usually less than 1.5 m) as will not adversely affect the surfacing on the traffic lane.

- Ensure rollers have the specified attributes. Ensure the specified number of rollers will be used, unless other compaction requirements are noted in the special provisions.
- If the contractor intends to use equipment other than the specified rollers to compact asphalt concrete, contact the district construction office to determine whether this equipment has been evaluated in accordance with California Test 113, "Evaluating the Capabilities of Asphalt Concrete Compactors". The district construction office maintains a listing of all compaction equipment that has been evaluated in accordance with the test. The Division of Construction notifies each district construction office of changes or additions. The listing also includes the operating conditions under which the equipment qualified. The contractor may use qualified equipment in the work without further testing provided the contractor adheres to the operating conditions set forth. If the proposed equipment is not listed, request the flexible pavement unit of the Office of Materials Engineering and Testing Services (METS) to evaluate the equipment.
- When compaction specifications for asphalt concrete are in effect, ensure that properly calibrated nuclear density gauges are available for the necessary compaction tests.
- Determine the atmospheric temperature, and prohibit the placing of asphalt concrete when applicable temperatures are below the minimum. Before placement, closely monitor local weather forecasts and conditions. Even a light drizzle can adversely affect the final product.
- For procedures to follow when resurfacing under structures that will result in reduced clearances, refer to Section 3-705B, "Clearance and Bridge Permit Rating Changes (Permanent)," of this manual.
- Before they take mat samples, ensure field engineers involved in asphalt concrete paving are certified through California Test 125, "Methods for Sampling Highway Materials and Products Used in the Roadway Structural Sections."

4-3903 During the Course of Work

4-3903 During the Course of Work

The following guidelines apply to non-QCQA projects. (For QCQA projects, refer to the *Manual for Quality Control and Quality Assurance for Asphalt Concrete.*)

4-3903A Plant Operations

During the course of work, take the following steps related to plant operations:

- For the asphalt concrete plant, maintain a daily record with the information required in Section 39, "Asphalt Concrete," of the *Standard Specifications.* File a copy of this information under Category 35, "Asphalt Concrete," in the project records.
- Ensure that production rates in continuous mix plants do not exceed those rates established during the aggregate weigh belt and asphalt meter calibration (California Test 109).

- Ensure that the proportioning equipment is interlocked as specified. For details on checking the interlock, refer to Section 4-9003A, "Proportioning and Mixing Operations," of this manual. This procedure is the same for asphalt concrete plants as it is for portland cement concrete plants.
- Observe the overall plant operation to ensure the contractor controls dust or smoke as specified. Request the contractor to correct any obvious violation and to cease any operation that is causing damage to adjacent property or to the asphalt concrete mixture.
- For each truckload of paving asphalt or liquid asphalt, obtain the required test report. Compare the report with the specifications. Shipments may be used before Caltrans samples and tests them if certificates of compliance accompany the shipments.
- Obtain a sample of asphalt binder and ship it to METS for testing as detailed in Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of this manual.
- Ensure aggregate is stored separately, according to the specified sizes. If any segregation, degradation, or intermingling occurs, require the contractor to empty the storage facility and to waste or rescreen the material.
- Ensure supplemental fine aggregate remains dry and is stored separately as specified.
- Before mixing with asphalt, obtain samples of the aggregate in accordance with the frequency shown in Section 6-1, "Sample Types and Frequencies," of this manual. Do not use aggregate samplers that do not safely produce a manageable-sized sample.
- When grading test or sand equivalent results exceed the limits for contract compliance, determine whether the asphalt concrete represented by the test is to remain in place or be removed. Note the decision in the daily report.
- Keep adequate records for removed material or material that remains in place but exceeds the grading limits for contract compliance. Do not make payment for material removed from the work. Also, ensure the specified deduction is taken for material that is allowed to remain in place even though it exceeds the grading limits for contract compliance.
- Ensure the temperature of the asphalt binder, aggregate, and completed mix are within the specified ranges.
- Ensure the batch size and feed rates do not exceed the mixing capacity.
- After calculating and selecting batch weights for batch-type asphalt concrete plants, inspect scale settings. Follow this inspection with daily checks. The scale settings control the amount of material from each bin; one erroneous scale setting can throw the entire batch out of specification.
- To ensure the aggregate is stored in the specified sizes, compare the material from each bin with the specifications. Order any necessary corrective action.
- Compare the gradings by plotting the actual grading curve against the design curve. Plot the gradings periodically because plotting provides a better indication than numbers alone.
- The contractor may adjust the proportions of primary sizes of aggregates.

However, any such adjustment must meet specified grading limits and should result in a stable mix. When adjustments vary significantly from the initial design's grading, request a new asphalt content calculation from the district materials laboratory based on the grading to be used.

- Sample and test aggregate and asphalt binder in accordance with the frequencies shown in Section 6-1, of this manual.
- Obtain samples of the completed mix, and in accordance with California tests 310, "Determination of Asphalt and Moisture Contents of Bituminous Mixtures," or 370, "Determining Moisture Content of Asphalt Mixtures or Mineral Aggregates," for moisture. You may also quickly check moisture content (based on your experience with a particular aggregate source) using the following method for batch plants:

  1. Take a shovelful of aggregate from the drier's discharge chute.
  2. Notice any steaming or dark spots on the aggregate.
  3. Pass a cool, shiny, clean mirror, spatula, knife or other similar item in a slow deliberate motion immediately above the aggregate.
  4. Observe the amount of condensed moisture on the item.
  5. Advise the contractor of any necessary adjustments to dry the aggregate.

- Perform California Tests 310 or 370 "as necessary for control." For the exact frequency of the tests, refer to Section 6-1, "Sample Types and Frequencies," of this manual. Early in production, take sufficient tests to determine factors such as the drier's heat versus the production rate versus the aggregate's moisture.
- Observe production at the batch plant to ensure the mixing time and sequence of withdrawal from the bins produce the specified homogeneous mixture. For batch mixing, do not approve a shorter mixing time than specified. The length of mixing time in a continuous-flow mixer is a function of the length of the mixing area and the rate of drop in the drier drum mixing. The most efficient pugmill mixing results when the material level remains at the top of the paddles throughout the length of the mixer. For best results, feeding must be continuous and uniform.
- Ensure that the temperature of the asphalt stays within the specified limits.
- When the contractor uses automatic batch mixing, ensure the automatic equipment functions within specifications.
- When the contractor uses any continuous mixing plant (drier drum or drier drum pugmill), ensure that the vibrating unit on the fine bins operates. Also, ensure that the low-level and no-flow interlock systems for the aggregate feeder bins and the asphalt storage function.
- Observe the operation of all weighing systems. Whenever scales and meters seem inaccurate, contact the district weights and measures coordinator for further assistance.
- In the batching process, consider the weight of the material falling from the bin gates to the weighing hopper after the gates are closed. Ensure the weigh box containing the total batch does not come in contact with anything that prevents a true indication of the batch weight.

- When intermediate storage does not occur, periodically check the batching by comparing the total weight of the batches in a truckload with the platform scale weight for the same load.
- Check the asphalt scales frequently to ensure the following:
  1. They can mark zero.
  2. The scale levers and knife edges move freely.
  3. No bind or drag exists on the lever system.
- When plants are used exclusively for one job, you can check the accuracy of meter-driven devices that proportion asphalt. To do so, compare meter totalizer readings with asphalt tank stabbings and also (in conjunction with an onsite vehicle scale) with the combined aggregate totalizer readings.
- Some plants are equipped with storage silos for asphalt concrete. Ensure this form of storage does the following:
  1. Prevents obvious segregation
  2. Maintains specified temperatures
  3. Maintains the minimum silo level as specified
  4. Does not exceed the maximum storage time
- Before the contractor loads the truck beds, ensure the absence of an excessive amount of parting agent or other contaminating material. Such material is excessive when it forms pools absorbed by the mix. Diesel or other petroleum-based products are prohibited.
- Ensure that all continuous mixing plants have a functional automatic blending computer. Prohibit the plant from producing material for Caltrans unless this automatic aggregate-asphalt proportioning system operates in good working condition.

4-3903B Street Operations

During the course of work, take the following steps related to street operations:

- For guidelines for inspecting prime coat and paint binder, refer to Sections 4-93, “Liquid Asphalts,” and Section 4-94, “Asphaltic Emulsions.” of this manual.
- From the mat behind the paving machine, obtain a sample of the completed mixture (using California Test 125, “Methods for Sampling Highway Materials and Products Used in Roadway Structural Sections”). Test the sample for extraction, moisture, and sieve analysis. Occasionally run stability tests. For the frequency and location of such testing, refer to Section 6-1, “Sample Types and Frequencies,” of this manual.
- Identify the samples to indicate both the stationing from which they were taken and also the approximate area they represent. Mark all acceptance samples for priority testing. Complete Form TL-0101, “Sample Identification Card,” adhering to the instructions printed in the book containing the forms and information in Section 6-105, “Field Tested Material Sample Identification,” of this manual. It is essential that you record the type of mix, grade, and source of asphalt and also the ordered percent of asphalt in the mixture. Remember to note whether the sample is for acceptance or special testing.

- As early as possible, analyze the test data. The best results come from obtaining test results on the day of sampling. If possible, samples representing drier-drum or continuous mixing should be tested in the field so the contractor can immediately correct any deviations.
- Ensure that placement occurs within the specified temperature range by taking sufficient measurements of air and asphalt concrete temperatures. Record these temperatures in the daily report, and on Form CEM-3501, "AC Production/ Placement Checklist."
- Along with atmospheric conditions, closely observe the queuing of asphalt concrete trucks. To prevent the cooling of the asphalt concrete mix to below the specified windrow temperature, ensure that extensive windrowing does not occur. To determine whether crusting has occurred and appropriate action should be taken, check the surface of the asphalt concrete mix in the truck or windrow.
- Ensure the specified equipment performs the spreading at the required thickness and with the required number of layers. Compare the spread rate against the theoretical rate, and if necessary, order adjustments. Note such observations in the daily report.
- Because of the high dollar value of the asphalt concrete and the necessity for an assistant resident engineer to know the weight of loads for spread calculations, load slips are required for asphalt concrete.
- For placing material, ensure the specified equipment performs the rolling in the specified order, for the required number of coverages, with the mixture's temperature above specified minimums. If the contractor uses a vibratory roller for compaction, ensure the use is in accordance with the operating conditions for which the roller was qualified. For these conditions, refer to the Vibratory Roller Qualification List. To check vibratory roller frequencies, use a vibratory reed tachometer.
- When compaction specifications are in use, test all areas in accordance with California tests 304, "Preparation of Bituminous Mixtures for Testing," and 375, "Determining the In-Place Density and Relative Compaction of AC Pavement."
- Ensure that longitudinal joints are offset as specified and that the joints on top courses correspond to the edges of traffic lanes.
- Before placing an adjacent top layer, ensure the contractor has trimmed the cold-transverse construction joints to a vertical face and to a neat line.
- Before placing an adjacent lane, decide whether longitudinal joints should be trimmed.
- Use a straightedge to determine whether the finished surface and transverse joints comply with specified tolerances. Note such measurements in the daily report.
- If using a tapered notch wedge device, ensure that the specical provisions allow the contractor to use a tapered notched wedge device to install a tapered logitudinal joint between traffic lanes.
- Ensure the contractor tests the notched wedge device for relative compaction.
- After acceptance of the contract, a compaction and core information spreadsheet must be submitted to the Office of Flexible Pavement, Material Engineering and Testing Services.

- Ensure the contractor surfaces miscellaneous areas as the plans and specifications require.
- Examine asphalt surfaces, and decide whether fog seal should be applied to shoulders. Fog seal must be applied to all asphalt concrete dikes and miscellaneous areas. For details about seal coats, refer to Section 4-37, "Bituminous Seals," of this manual.
- Prohibit the contractor from applying fog seal to open-graded asphalt concrete or any traveled way.

4-3904 Measurement and Payment

4-3904 Measurement and Payment

For details of measurement and payment, review contract specifications. Make necessary measurements and counts.

For measuring asphalts, liquid asphalts, and asphaltic emulsions, refer to Section 4-92, "Asphalts," Section 4-93, "Liquid Asphalts," and Section 4-94, "Asphaltic Emulsions," of this manual.

For asphalt concrete that is allowed to remain in place, yet the aggregate gradings for this asphalt concrete do not meet contract compliance, make the appropriate deductions as specified.

For guidelines on how to weigh asphalt concrete, refer to Section 3-9, "Measurement and Payment," of this manual.

Conduct of the Work

Conduct of the Work

Conduct of the Work

5-001 Resident Engineer's Pending File

5-001
Resident Engineer's Pending File

For guidance and information, the project engineer assembles and forwards to the resident engineer a set of letters, memoranda, and other data entitled, "resident engineer's pending file." This file must contain all pertinent information, comments, and advice that may be useful on the specific project to which the resident engineer is assigned. A detailed list of the information that should be included in the resident engineer's pending file is contained in Appendix GG, "Project Data Checklists," of the *Project Development Procedures Manual*. The file usually includes the following:

- Memoranda between programs, service centers, and districts, especially comments about preliminary reports and dummy special provisions.
- Special requirements that are enumerated in the freeway agreement and that may require action by the resident engineer. For instance, a special requirement may be notification of the date work begins on locally owned facilities.
- Memoranda about materials from the Office of Materials Engineering and Testing Services or the district materials unit.
- Copies of right-of-way agreements that require work to be done under the contract or that affect the project's construction.
- Copies of "Notice to Owner," which covers utilities and their completion status.
- Copies of the partially completed "Utility Service Request" form, which the resident engineer will use for the installation and coordination of utility services.
- Copies of correspondence giving the background of any unusual project features.
- All pertinent engineering data previously prepared in connection with the project. This data should include the project engineer's quantity calculations.
- Copies of the project report, preliminary report, and materials reports.
- A copy of the "materials information" as given to prospective bidders.
- A copy of the environmental document, including any permits, agreements, and commitments.
- A separate summary of all environmental commitments, as well as any special instructions or explanations for meeting permit and other legal requirements and commitments to other agencies.

The resident engineer must consult with the project engineer who forwarded the file if the file has any of the following problems:

- Information appears to conflict.
- Information appears to be missing.
- Additional information or explanations are required.

5-002 Preconstruction Conference With Caltrans Personnel

5-002 Preconstruction Conference With Caltrans Personnel

Before the start of construction, the resident engineer should review the job with the following people:

- Project manager
- Project engineer
- Right-of-way agent
- Hydraulics engineer
- Traffic engineer
- Materials engineer
- Maintenance superintendent
- Environmental planner
- Public information officer
- Landscape architect (if landscape work is included in the project)
- Local agencies and communities
- Affected utility companies
- Others who may have a direct interest in the project

At this preconstruction stage, such a review will significantly aid in explaining the reasons for certain design features such as the following:

- Right-of-way obligations
- Signing and traffic handling difficulties
- Materials sites
- Selected material
- Foundation treatment
- Potential slides
- Environmental commitments
- Potential drainage and maintenance problems, including erosion control and water pollution

The resident engineer must ensure implementation of environmental mitigation measures included in the project approval. To be fully informed of the environmental mitigation measures, commitments, or concerns on projects that include environmental commitments, the resident engineer must meet with the assigned environmental representative. At the same time, the resident engineer can reach agreement on both the assistance required from environmental specialists and also the tentative schedule and plan for environmental monitoring.

On projects involving structure construction personnel, preconstruction conferences are mandatory and should be held as soon as possible after bids are opened. The conferences should include structure and construction engineers, the resident engineer,

and the structure representative. These personnel should reach agreement regarding the following items:

- Office facilities. The district must provide suitable office space and furniture for both district and structure field personnel. When the office facilities are trailers, the resident engineer and structure representative should both occupy the same trailer. When the office facilities are in a building, the engineer and the representative should occupy adjacent rooms. This arrangement facilitates the assignment of the structure engineer as acting resident engineer during extended absences of the assigned resident engineer.
- Personnel for the total work. Conference participants must discuss the total work (both road work and structure work) and take full advantage of instances where people could be used interchangeably to reduce the number of people on the project. When the contractor's schedule is available, meeting participants must review the personnel required.
- Division of the work. The items should be categorized as roadwork and structure work , In some cases, the item may be divided by portions of items or by phases of the work. Before the start of work, the Office of Structure Construction requires from the structure representative a written report on this categorization of the work.

5-003 Preconstruction Conferences with the Contractor

5-003 Preconstruction Conferences with the Contractor

Before the start of work, a conference must be held. Depending on the project's complexity, more than one conference may be desirable to limit the scope and number of individuals attending. The conferences must include the resident engineer and structure representative and may include principal assistants, the construction engineer, the district construction deputy director, the contractor's superintendent, and other key personnel. Subject to district policy, specialists such as the district labor compliance officer and the district safety coordinator, among others, may be included. Alternatively, the resident engineer may cover the respective responsibilities.

When environmental commitments have been made that affect or constrain the contractor's operations, appropriate environmental specialists should also attend the preconstruction conference with the contractor.

Meeting participants should discuss, among other items, the following:

- Work plans
- Equipment to be used
- Progress schedule
- Layout of job
- Labor compliance
- Equal employment opportunity
- Safety requirements
- Water pollution control requirements

This discussion affords both parties a common understanding of the proposed work and the problems and possible solutions that may be expected during the life of the contract.

The contractor should receive advance notice of the items that will be discussed. Among other documents, the contractor must bring a copy of the contractor's "Code of Safe Practices" and a water pollution control plan. The project file must contain a record of the conferences (or the reason for omitting a conference). Depending on the conference's complexity, the record can be a relatively complete set of minutes or a copy of the resident engineer's daily report.

The police, fire department, public transportation agency, schools, and other affected agencies should receive any information developed from the meetings that will affect these agencies' operations.

In the list below, we present the guidelines for the preconstruction conference. However, bear in mind that these are reminders only. Items will or will not be included depending upon their applicability to a specific project. Also, consider any previous experience of a particular contractor with Caltrans projects. Further, the district construction office may have completed some of the items listed below, and therefore, these items need not be included at the conference.

- Introduce all participants, including in your introduction statements about each person's responsibilities for the project.
- Discuss superintendence as well as lines of authority for both contractors and Caltrans personnel. If you have not yet received it, request the written information required by Section 5-1.06, "Superintendence," of the *Standard Specifications*.
- Discuss the subcontracting requirements covered in Section 8-1.01, "Subcontracting," of the *Standard Specifications*.
- When required by the special provisions, discuss railroad insurance.
- If not yet received, request evidence of insurance, as required by Section 7-1.12, "Indemnification and Insurance," of the *Standard Specifications*.
- Discuss requirements related to labor compliance and equal employment opportunity. Advise the contractor of the deadlines for submitting payrolls and other required documents. Also advise the contractor of the contractual and administrative deductions that will be applied for noncompliance. Provide the necessary state-furnished forms and posters.
- Review the contract's safety requirements.
- Discuss the procedure for inspecting materials, particularly the early submittal of Form CEM-3101, "Notice of Materials to Be Used."
- When the contract requires, discuss the contractor's quality control plans.
- Discuss the requirements for submitting working drawings.
- Discuss the progress schedule (if the contract requires). If the contract requires a critical path method schedule, discuss the provisions for submitting, reviewing, updating, and revising it. See Section 3-803, "Progress Schedule," of this manual.
- Discuss weighing procedures, weight limitations, and the Caltrans policy on overloads. For more information, see Section 3-702, "Load Limitations," of this manual.

- Advise the contractor of administrative procedures and deadlines for payment for material on hand. Give the contractor the required Form CEM-5101, "Request for Payment for Materials on Hand."
- Discuss the requirements for submitting survey requests and any significant survey issues.
- Review the contract's provisions about water pollution control. Discuss the contractor's water pollution control plan.
- Remind the contractor to submit a program to control water pollution before beginning work (or waive the specified requirement if such an action is in order).
- Discuss the requirements for handling public traffic.
- Discuss any unusual project features.
- Remind the contractor of the contractual procedures to follow in the event of disagreements. Emphasize the necessity for timely written notices. Furnish Form CEM-6201, "Notice of Potential Claim."
- Discuss the scheduling of utility work. For a discussion of utility preconstruction conferences, see Section 3-809,"Utility and Non-Highway Facilities," of this manual.

5-004 Resident Engineer's Daily Report

5-004 Resident Engineer's Daily Report

The following instructions are directed to the resident engineer who must do the following:

- For each contract day during the project's life, make a daily report on Form CEM-4501, "Resident Engineer's Daily Report/Assistant Resident Engineer's Daily Report."
- Include any information that may be pertinent even though no activity may have occurred. For example, such information could include support for determining working or nonworking days. Include the following in the daily report:

  1. Important discussions and agreements with the contractor. Record these on the day discussed. Give the names of specific persons to whom instructions were given or with whom agreements were made. If the contractor objects or comments, note these items, too. Actual quotations on significant discussion points can be useful. Through letters to the contractor, confirm import-ant verbal instructions. (Also, see Section 5-403, "Response to Disputes," of this manual.)
  2. A general statement about the type of work done. Include the controlling operation and any facts concerning the work's progress.
  3. Weather conditions such as maximum and minimum temperatures and precipitation, among other items. Expand on exceptional weather conditions.
  4. Statements of any other important facts pertaining to the contract that are not specifically covered elsewhere in the contract records.

- Keep the report concise, yet include any important information. The report should not contain routine matters, such as quantities placed, that can be found in other records.

- Promptly send one copy of the daily report to the construction engineer, who will review the copy. After the review, the construction engineer may discard the copy or file it until the project's completion, in accordance with district policy. Retain the original copy with the project records.

5-005 Assistant Resident Engineer's Daily Report

5-005 Assistant Resident Engineer's Daily Report

To report the activity for a contract item, assistant resident engineers must submit a report for each contract day. Complete the report on Form CEM-4601, "Assistant Resident Engineer's Daily Report." Also, use this form for reporting extra work and for labor compliance. The form contains a narrative portion and a tabular portion.

The narrative portion of the assistant resident engineer's report should include statements about the contractor's operation and the activities of the individual preparing the report. The description of the contractor's operation should include the following:

- The location where the work was performed
- A brief description of the operation
- The quantities placed or the amount of work completed for the day
- Significant statements by the contractor

The statement of the assistant resident engineer's activities should be sufficient to demonstrate the performance of duties such as those outlined in Chapter 4, "Construction Details," of this manual. Record observations of contractor compliance or noncompliance, actions taken, statements made to the contractor, and approvals given.

Use the tabular portion of Form CEM-4601, to report the following:

- Extra work. For details, see Section 3-904D, "Extra Work Records," of this manual.
- Hours worked by labor and equipment. Provide sufficient detail to permit a review of the contractor's costs in a manner similar to a force account. Using the publication titled *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)*, sufficiently identify equipment to enable the determination of applicable rental rates. Sufficiently identify the labor classification to enable determination of the appropriate wage rate. Also record the equipment's arrival and departure dates, as well as idle time for breakdowns or other reasons. This information can be used to make a possible adjustment of compensation due to an overrun or an underrun of quantities, a change in character, a protest, or a potential claim.
- The name of the contractor or subcontractor performing the work. When the report will be used to determine compliance with the contract's labor provisions, you must include the names or identification numbers of the contractor's personnel or report these separately. However, if the report is not for determining compliance with the contract's labor provisions, you only need to include in the tabular portion of the daily report the respective classifications of the work being performed and the number of hours worked on the date the report covers.

Distribute the assistant resident engineer's reports as follows:

- Retain the original of all reports in the project files in the field office.

- File reports covering extra work according to the procedure in Section 3-01, "Organization of Project Documents," of this manual.
- Distribute all other copies in accordance with district policy.

See Section 5-102, "Organization of Project Documents," of this manual for details to consider when establishing a system for handling assistant resident engineer's reports on a specific project.

5-006 Maintenance Reviews

5-006 Maintenance Reviews

Keep maintenance superintendents and supervisors informed of the start of work and job progress for all construction projects within the superintendents' and supervisors' maintenance areas. Before the start of construction, send a copy of Form CEM-0101, "Resident Engineer's Report of Assignment," to the maintenance region manager.

Provide the maintenance superintendents and supervisors an opportunity to review the contract with the resident engineer and to conduct a joint field review of the job site within the first two weeks of construction. The intent of this field review is to accomplish the following:

- Discuss the scope of the project.
- Coordinate contingency planning for traffic management.
- Discuss Caltrans' maintenance responsibility as described in Section 3-704E, "Highway Maintenance," of this manual.
- Discuss complex construction activities that could affect adjacent maintenance operations.
- Discuss features requiring special attention.
- Discuss manufacturers' warranties and service instructions.
- Schedule regular reviews. When the contract work is 50 percent complete schedule at least one review, unless both construction and maintenance representatives agree the review is unnecessary.

When the project nears 90 percent completion, invite the maintenance superintendent, supervisor, or both for a final field review of the project. Ensure this review includes identifying all items necessary to comply with the construction National Pollutant Discharge Elimination System permit, Section A, "Storm Water Pollution Prevention Plan," Subsection 7, "Stabilization." A copy of the permit can be obtained from the State Water Resources Control Board via the following web address:

http://www.swrcb.ca.gov/stormwtr/docs/finalconstpermit120602.pdf

The resident engineer should work closely with the district maintenance personnel to make minor field adjustments to the project. The project manager must approve any amendments to the contract plans or specifications that significantly affect project cost, scope, or schedule.

When the work nears completion and just before contract acceptance, the resident engineer must notify the maintenance superintendent or supervisor to facilitate the transfer of maintenance and responsibility from the contractor to Caltrans forces.

5-007 Federal Highway Administration Involvement in Contract Administration

Federally funded projects are classified as either full oversight or state-authorized to indicate the Federal Highway Administration (FHWA) oversight requirements as stated in the stewardship agreement between FHWA and Caltrans. The stewardship agreement between FHWA and Caltrans can be found by visiting the budgets web site:

http://onramp/hq/budgets/library.htm

Caltrans assigns project numbers to federally funded projects, and upon FHWA classification, adds a suffix "N" or "E" to the project number. Projects with the suffix "N" are subject to full FHWA oversight requirements. Projects with the suffix "E" are state-authorized.

Caltrans has been delegated oversight approval authority for all federally funded projects except those activities not covered by Title 23 of the United States Code (National Environmental Policy Act [NEPA], right-of-way, and civil rights among other activities). Consequently, there are several issues or events that require the resident engineer to seek FHWA approval or request FHWA involvement in a project.

Projects with the suffix "N" are subject to full FHWA oversight requirements, so early and frequent communication with the FHWA engineer is essential to ensure full compliance with all federal requirements. Project with the suffix "E" are exempt from full FHWA oversight requirements. Resident engineers are not formally required to communicate with the FHWA engineer except for a few instances. Informal discussions for technical guidance are encouraged.

5-007A Events invoking Federal Highway Administration Involvement on Full Oversight projects

There are several events during the construction phase of an "N" project that may make FHWA involvement necessary. The resident engineer should meet with their FHWA engineer immediately following award of the contract to determine when FHWA involvement, if any, is necessary. The FHWA engineer is contacted sufficiently in advance of any project event deemed necessary to allow their participation. In all other cases, contact the FHWA engineer as soon as practical to ensure federal concurrence and participation.

Events invoking FHWA involvement may include:

- Preconstruction conferences.
- Partnering workshops.
- Value analysis studies.
- Notices of potential claim (NOPC):
  1. Submission and updates to the list of NOPCs to the NOPC log to FHWA engineer.
  2. Resident engineer's determination of NOPC merit.
  3. Notice of potential claim resolution.
  4. Updates to items 1 through 3 above.

- Dispute review boards:
  1. Formation.
  2. Meeting invitations.
  3. Recommendation of dispute review board.
  4. Copies of Caltrans and contractor acceptance or rejection of DRB recommendations.
- Proposed final estimate: Submit a copy of the final acceptance checklist to FHWA engineer (see Example 5-0.1 at the end of this section) with a copy of the proposed final estimate.
- Claims:
  1. Exceptions to the proposed final estimate payments.
  2. FHWA agreement to amount of settlement.
- Director days.
- Boards of review:
  1. Meetings.
  2. Recommendations.
- District Director Determinations.
- Arbitration - Division of Construction coordinators will be responsible for keeping the FHWA area engineer informed of:
  1. Filings.
  2. Hearings.
  3. Settlements.
  4. Decisions.
- Other major milestones, events, or occurrences as deemed necessary by the resident engineer and the FHWA engineer.

Example 5-0.1 Final Acceptance Checklist for Federal-Aid "N" Projects

FHWA
FINAL ACCEPTANCE CHECKLIST
FOR FEDERAL-AID "N" PROJECTS

Project Information:

EA No. _____ Federal-aid No. _____
Project Description: _____
District/County/Route/KP: _____
Date Awarded: _____ Approval Date: _____
Time Started: _____ Work Started: _____
Contract Days: _____ Final No. Working Days:_____
Original Completion Date: _____ State Acceptance Date: _____
Liquidated Damages (No. of days and total $ amount): _____

Submittals:

	Submitted?	Date:
Material Certification (CM 6-1.1)	Yes/No – N/A	_____
Form FHWA-47M	Yes/No – N/A	_____
Proposed Final Estimate	Yes/No – N/A	_____
Last Statement of Working Days	Yes/No – N/A	_____
Contractor's Written Statement Of Claims (Submitted Separately)	Yes/No – N/A	_____
List of contract change orders (Approved and Pending) (Participating/Non-Participating)	Yes/No – N/A	_____
List of Time Extensions (FHWA Approved/Not Approved)	Yes/No – N/A	_____
Form CEM-2402 (F) Final Report Utilization of DBE	Yes/No – N/A	_____
Mitigation Monitoring Reporting Record (If available, status of environmental commitments if not completed)	Yes/No – N/A	_____

Additional Information:

Labor Compliance Problems: _____
_____
Any other changes: _____
_____

(Original – Project File cc – FHWA – with Proposed Final Estimate)

Section 3 Contract Change Orders

5-307C (2) Project Management

For contract change orders with the following conditions, obtain concurrence from the project manager:

- Potential for significant delays to the planned work.
- Unanticipated large project cost increases, including those requiring a request for additional funds.
- Changes that may be considered outside the scope or intent of the planned work.

The project manager's duties relating to contract change orders include the following:

- Monitoring project costs.
- Expediting decisions by functional units as needed, so as not to delay or otherwise adversely affect the contractor's operations.

5-307C (3) Structures

Where changes are to be made that involve structures, the Office of Structure Construction determines the need for the change, the intent or content of the change order, and any methods or restrictions in doing the work. The resident engineer is responsible for administration, including processing for approval of the contract change order. The structure construction engineer and personnel in Engineering Services may need to concur. For procedures for obtaining concurrence for structure contract change orders, see Section 7-00, "Contract Change Orders," of the *Bridge Construction Records and Procedures Manual*.

5-307C (4) Materials

The district materials engineer, as well as the project engineer, must concur with all contract change orders that change or modify material specifications. Also, seek concurrence from the district materials engineer for proposed changes in structural section, slope rates, installation of subsurface drains, removal of unsuitable material, erosion control, and repair of slides and slipouts.

5-307C (5) Traffic

Obtain concurrence from the appropriate traffic engineer in the district for contract change orders affecting traffic management plans, hours of work, detours, signing, highway lighting, traffic signals, illuminated signs, guardrail, barriers, delineation, or any other traffic control device or facility. Clear any proposed special sign with the district traffic design engineer.

5-307C (6) Maintenance

Obtain concurrence from the appropriate maintenance region manager or engineer for changes affecting maintenance facilities, lands and buildings, and maintenance operations. Concurrence from the appropriate maintenance manager or engineer is required for all contract change orders affecting the use of maintenance funds.

5-307C (7) Right-of-Way

Obtain concurrence from the district right-of-way unit for any changes to right-of-way contracts or agreements, right-of-way fencing or alignment, or gates.

Contact the district right-of-way unit for assistance with any required rights-of-entry permits, easements, or agreements.

The district utility coordinator must concur with all changes involving utility work. The district utility coordinator must also make proposed revisions to Form RW 13-14, "Notice to Owner." For information about coordinating utility work, see Section 3-809, "Utility and Non-Highway Facilities," of this manual.

5-307C (8) Environmental

For environmental concerns and requirements, see Chapter 7, "Environmental," of this manual. Contact the district environmental unit for assistance and concurrence with any change affecting environmental considerations or requirements or affecting obligations or commitments to other agencies.

The environmental document on any project is valid only for the work described by the document and shown on the plans submitted for environmental approval. For any work proposed in addition to or as a deviation from the approved work, consult with the district environmental unit. Significant changes may require amended or additional environmental approval or permits. The types of changes that may require additional consultation and approval include the following:

- New materials sites
- New haul or access roads
- Previously unidentified clearing and grubbing and hazardous materials
- Increases in earthwork
- Utility relocation
- Diversion or extraction of water from a stream not covered by a Lake/Streambed Alteration Agreement, more commonly known as a "1601 permit," with the Department of Fish and Game
- Disposal sites
- Revision to allowable work windows

5-307C (9) Locally Funded Projects

For guidelines for processing contract change orders on locally funded projects, see Section 5-310, "Locally Funded State Highway Projects, " later in this section.

5-308 Federal Highway Administration Contract Change Order Requirements

5-308 Federal Highway Administration Contract Change Order Requirements

5-308A Full Oversight Projects

Projects with a suffix of "N" are subject to full FHWA oversight requirements. Early and frequent communication with the FHWA engineer is essential to ensure full compliance with all federal requirements.

5-308A(1) Federal Highway Administration Approval Requirements– Major Contract Change Orders

Major contract change orders require FHWA approval. The resident engineer must obtain approval before proceeding with a proposed change. The resident engineer may obtain same-day verbal approval by telephone upon furnishing the FHWA engineer with the information they request. Following the verbal approval, the FHWA engineer sends the written approval electronically (e-mail, fax, or both). The district sends a copy of the contract change order and contract change order memorandum to the FHWA engineer upon approval of the contract change order.

Written and signed FHWA approval is required for any of the following major contract change orders:

- Contract change order that would increase the cost greater than $200,000.
- Contract change order that would increase the cost of anticipated supplemental work item listed in the detail estimate greater than $200,000.
- Supplemental contract change orders above the $200,000 threshold.
- Changes in specifications (with the exception of lane requirements and hours of work charts).
- Changes in method of payment.
- Changes in material processing.
- Changes in type or quantity of materials furnished (with the exception of minor building materials).

  Example:

  The contract change order changes the individual aggregate base to an asphalt concrete material.
- Changes in proprietary or sole source materials for which specific or blanket approval has not been previously given.
- Waivers to the Buy America requirements, above the minimal amount that is allowed in Section 3-605, “Certificates of Compliance,” of the *Construction Manual* and the project special provisions.
- Cost Reduction Proposal.
- Experimental Work Plan.

- Changes to federal environmental requirements such as:

  1. Environmental mitigation. See Mitigation Monitoring Reporting Record, if available.

  2. Permit conditions.

  3. Agreements with federal resource agencies.

     Example:

     Revising sound walls – height, length, location, adding auxiliary lanes, and disturbing a site on or eligible for National Register of Historic Places

- Introduction of new social, environmental, or economic issues that need to be addressed under applicable federal laws
- Changes to, or requiring of, mandatory disposal or borrow sites, Public Interest Finding and National Environmental Policy Act (NEPA) clearance may be needed.
- Expansion of project limits beyond the limits set in the environmental document.
- Form of payment (not just a contract change order) to a contractor resulting from a claim, board of review, exception to proposed final estimate, district director determination or arbitration.
- Supplemental contract change orders to all of the above.
- Change resulting in a contract time extension of 20 or more working days. Additionally, if time is extended by more than 20 percent of the original contract working days, then that change and each subsequent contract change order to extend time.

5-308A(2) Federal Highway Administration Approval Requirements– Minor Contract Change Orders

Contract change orders other than those listed above are considered minor. Although approval may be granted retroactively, minor contract change orders require written and signed FHWA approval. These approvals occur during FHWA construction reviews, or occur with final approval of the project by FHWA.

5-308B State-Authorized Projects

Projects with a suffix of "E" are state-authorized, so resident engineers are not formally required to communicate with the FHWA engineer except for a few instances. Informal discussions for technical guidance are encouraged.

5-308B(1) Federal Highway Administration Involvement Requirements– Major Contract Change Orders

There are several events that may make FHWA involvement necessary. The FHWA engineer is contacted sufficiently in advance of the project event deemed necessary to allow their participation. In all other cases, contact the FHWA engineer as soon as practical to ensure federal concurrence and participation.

FHWA involvement is required for any of the following major contract change orders:

- Changes to federal environmental requirements:

  1. Environmental Mitigation. See Mitigation Monitoring Reporting Record, if available.

2. Permit conditions.

3. Agreements with federal resource agencies.

   Example:

   Revising sound walls – height, length, location, adding auxiliary lanes, and disturbing a site on or eligible for the National Register of Historic Places.

- Introduction of new social, environmental or economic issues that need to be addressed under applicable federal laws.
- Changes for mandatory disposal or borrow sites – Public Interest Finding and NEPA clearance may be needed.
- Waivers to the Buy America requirements, above the minimal amount that is allowed in Section 3-605, "Certificates of Compliance," of the *Construction Manual* and the project special provisions.
- Project limits expanding beyond the limits set in the environmental document.

5-308C All Federally Funded Projects

For each case listed in section 5-308A(1) and 5-308B(1), the resident engineer contacts the Federal Highway Administration engineer and provides documents as necessary. In addition to the major and minor contract change orders listed above for "N" and "E" projects, there are several other issues or events that may invoke the involvement of the FHWA. See Section 5-007 "Federal Highway Administration Involvement in Contract Administration."

5-309 Fund Segregation Determination

5-309 Fund Segregation Determination

Funds for a project may come from more than one source, such as from state highway funds, local funds, and federal funds. For a contract change order, the resident engineer must segregate funds between the different fund sources. For more information on project funding, see Section 5-2, "Funds," of this manual. Show the proper distribution of contract change order funding on Form CEM-4903, "Contract Change Order Memorandum."

Each contract change order may have an effect upon each source of funds provided for a particular project. Segregation of these funds is only necessary if the funds differ from the pro-rata share as indicated in the federal detail estimate. If the contract change order funding is the same as that indicated in the detail estimate, simply mark the appropriate box on Form CEM-4903.

A contract change order may not be eligible for participation from one or more of the funding sources, depending upon the location and the work to be performed.

For example, a contract change order written for a project funded from both federal and other sources may not be eligible for federal participation. In this case, the cost of the contract change order must be distributed between the other funding sources. In the box in the lower right-hand corner of Form CEM-4903, show the percent of participation by each funding source.

At the beginning of the project, the resident engineer should receive the federal detail estimate with an estimate for each category of funds and the applicable limits of eligibility. If not, contact the project manager. In some cases the FHWA transportation engineer has a color-coded plan title sheet for more complex multiple-funded projects.

5-310 Locally Funded State Highway Projects

Generally, participation will be based on Caltrans' original agreement with the contributing agency.

Before making changes that affect work for contributing agencies, ensure that such changes are within the scope of the agreement. If not, take action (usually through the district local projects unit) to have the agreement modified.

In the margin of the headquarters and district copies of contract change orders covering the work, obtain the signature of an authorized representative of the affected agency.

Include in the contract change order memorandum sufficient information to identify the portion of the work that is applicable to the contributing agency. As soon as the contract change order and memorandum is approved, send the Division of Accounting Services, Accounts Receivable and Program Accounting section a copy.

5-311 Contract Change Order Approval

Caltrans must approve a contract change order, and whenever possible, the contractor should sign it. When the contractor signs a contract change order, it is referred to as "executed." If the contractor refuses to sign the contract change order, then Caltrans may approve it "unilaterally."

So that the contractor will execute the contract change order, make every effort possible to reach agreement. However, do not delay the work by waiting for the contractor to respond. If necessary, submit the contract change order for unilateral approval. Receipt by the contractor of an approved contract change order establishes a time for protest. If the contract change order is not protested within the specified time, it is considered an executed contract change order. Refer to Section 4-1.03A, "Procedure and Protest," of the *Standard Specifications* and Section 3-403, "Changes," in this manual.

You may routinely submit for approval without the contractor's signature any supplemental contract change orders written solely to increase force account funds. However, should the extent or type of work covered in the supplemental contract change order differ from that included in the original, submit the supplemental contract change order to the contractor for acceptance.

On sensitive or complex contract change orders, districts are encouraged to submit draft contract change orders to the Division of Construction for review and recommendation before preparing the final contract change order. In following this practice, however, discuss the work with the contractor in the usual manner.

5-311A Division of Construction Approval

The Division of Construction must approve the following types of contract change orders.

1. Any contract change order that does not provide for anticipated supplemental work that would increase the cost of the contract by more than $200,000.
2. Any contract change order that increases the cost of anticipated supplemental work listed in the detailed estimate by more than $200,000.
3. Once the $200,000 threshold is reached, each supplemental contract change order.
4. Any change in the following:

- Specifications (with the exception of "Lane Requirements and Hours of Work" charts)
- Method of payment
- Method of materials processing
- Type or quality of materials to be furnished (with the exception of minor building materials)
- Proprietary material for which specific or blanket approval has not been previously received.

5. Any change that results in a contract time extension of 20 or more working days. Additionally, if time is extended by more than 20 percent of the original contract working days, then that change and each subsequent contract change order to extend time.

Projects with a suffix of "N" are subject to full FHWA oversight requirements. Major contract change orders require FHWA approval before commencing the work authorized by the contract change order. Refer to Section 5-308A(1) "Federal Highway Administration Approval Requirements – Major Contract Change Orders," in this manual. FHWA approval is required before requesting Division of Construction approval.

For a contract change order requiring Division of Construction approval, the Division of Construction will authorize the district to issue and approve the contract change order. Copies of contract change orders transmitted to headquarters for district authority to issue and approve must bear the resident engineer's signature, and the properly authorized person in the district must sign the "approval recommended" line. Follow the procedures described below under "Division of Construction Prior Authorization" and "District Prior Authorization" for prior approval of contract change orders.

5-311B District Approval

The district director may approve or delegate authority to approve contract change orders that do not fall under the requirements for Division of Construction approval.

District approval of contract change orders may not be delegated below the level of a construction engineer or senior-level resident engineer. Within this delegation, senior-level resident engineers or construction engineers may be given authority to approve contract change orders that increase the contract cost or approved supplemental work by up to $50,000.

Only the Division of Construction or district construction deputy director may approve contract change orders for cost reduction incentive proposals.

5-311C Division of Construction Prior Authorization

For those changes that require Division of Construction approval, request prior authorization from the Division of Construction. To send the information necessary to evaluate the change, use the procedure established between the district and the Division of Construction contract reviewer.

If sufficient information is included in the request for prior authorization, the Division of Construction will authorize the district to issue and approve the contract change order. Authority to issue and approve a contract change order allows the district to authorize the resident engineer to order the contractor to proceed with the work. The contract change order may then be approved in the district.

If the proposal appears to be satisfactory but more information is needed, the Division of Construction may authorize the district to proceed with the work. This allows the resident engineer to order the contractor to proceed with the work. However, follow district procedures to ensure that construction engineers are aware of and concur with the change. When the necessary information is received, the Division of Construction will authorize the district to issue and approve the contract change order.

If the proposed work seems inappropriate, or the submittal lacks sufficient justification to support the proposed change, the Division of Construction will request additional information or will not authorize the change.

5-311D District Prior Authorization

Districts must establish procedures for issuing prior authorization of contract change orders. After receiving prior authorization, the resident engineer may order the contractor to proceed with the work. This order, as well as the prior authorization, must be dated and in writing. In the case of a contract change order requested by the contractor, the district must have written assurance before allowing work to proceed that the contractor will execute the contract change order.

Actively pursue preparation and final approval of contract change orders for work covered under a prior authorization. Prior authorization does not include the authority to make payments for the work.

5-312 Copy Distribution

5-312 Copy Distribution

For full oversight federal projects, send two copies, with all attachments, of each contract change order approved by the district to the Division of Construction contract reviewer. For all other projects, send one copy of contract change orders approved by the district to the Division of Construction contract reviewer.

5-313 Cost Reduction Proposals

5-313 Cost Reduction Proposals

For procedures for a cost reduction proposal, see Section 3-5, “Control of Work,” of this manual.

Prepare all cost reduction proposal contract change orders as a complete package, with no indeterminate or deferred time or cost considerations.

Give careful attention to the clauses in the contract change order covering payment. Cost reduction incentive change orders may involve any combination of contract item work, adjustments in compensation, and extra work at agreed price.

Contract item prices for the contract items possibly may not represent the costs of doing either the planned or changed work as computed on a force account basis. In this case, in addition to increases and decreases at contract prices, include adjustments in compensation to reflect the actual force account cost of increases

and decreases in contract item quantities. Also, in the analysis of cost savings, you may have to consider adjustments based on a 25 percent overrun or underrun.

Cost reduction proposal contract change orders must include an adjustment in compensation that returns one half of the savings to the contractor. Determine the adjustment in the following manner:

- Determine the total decrease in construction cost. This decrease will be the sum of increases and decreases in contract items at contract unit prices, adjustments in compensation including change in character adjustments, and extra work at agreed price.
- Provide for an adjustment in compensation to pay the contractor one half of the total decrease.

5-314 Examples of Contract Change Orders

5-314 Examples of Contract Change Orders

The following are examples of contract change orders and contract change order memorandums. Use these "cookbook" examples and standard clauses cautiously. The examples are for guidance and general format only. For instance, the examples contain assumptions that may or may not fit actual project situations. Also, the *Standard Specifications* and special provisions in use at the time the examples were written are the basis for the example contract change orders. Do not assume that your project uses the same specifications. Base contract change orders on specifications included in the project for which the contract change order is written.

The following list provides brief descriptions of the example contract change orders and method of payment included in this section:

Example 5-3.1	Flagging and Traffic Control. Extra Work at Force Account.
Example 5-3.2	Flagging Only. Extra Work at Agreed Price.
Example 5-3.3	Resolution of a Notice of Potential Claim. Adjustment in Compensation.
Example 5-3.4	Compensation for Late Payment of Extra Work Bills. Adjustment in Compensation.
Example 5-3.5	Eliminate Portion of a Lump Sum Contract Item with a Specified "Cost Break-Down." Adjustment in Compensation. Clause for NoAdjustment Due to Eliminated Work.
Example 5-3.6	Change in Specified Material. Change in Character Adjustment in Compensation.
Example 5-3.7	Additional Work. Change Material Specifications. Increase in Contract Items. Change in Character Adjustment. Extra Work at Force Account.
Example 5-3.8	Compensation for Right-of-Way Delay. Adjustment in Compensation.
Example 5-3.9	Cost Reduction Incentive. Decrease Contract Item. Adjustment in Compensation.
Example 5-3.10	Additional Work. Increase Contract Items. Clause for Final PayItems. Extra Work at Agreed Price.
Example 5-3.11	Adjustment for Asphalt Price Fluctuation. Adjustment in Compensation.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-PM FED NO.
FROM Resident Engineer	
CCO NO. 1 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 230,000.00
$ 20,000 ☒ INCR ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☒ NO
SUPPLEMENTAL FUNDS PROVIDED $ 20,000 for flagging and traffic control	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This change order provides for

Flagging and traffic control work specified in the *Standard Specifications*.

The *Standard Specifications* and *Special Provisions* specify certain work to be performed to expedite the safe and convenient passage of public traffic around and through the work. Such work is specified to be paid for as extra work. This contract change order provides for payment as extra work at force account of all such traffic-related work to be performed on this project.

This contract change order will not affect contract time and, therefore, provides for no adjustment in time of completion.

CONCURRED BY:	
CONSTRUCTION ENGINEER/BRIDGE ENGINEER	DATE
PROJECT ENGINEER	DATE
PROJECT MANAGER	DATE
FHWA REP.	DATE
ENVIRONMENTAL	DATE
OTHER (SPECIFY)	DATE
	DATE
HQ OR DISTRICT PRIOR APPROVAL BY	DATE
RESIDENT ENGINEER SIGNATURE	DATE

ESTIMATE OF COST

	THIS REQUEST	TOTAL TO DATE
ITEMS	$ 0.00	$ 0.00
FORCE ACCOUNT	$ 20,000.00	$ 20,000.00
AGREED PRICE	$ 0.00	$ 0.00
ADJUSTMENT	$ 0.00	$ 0.00
TOTAL	**$ 20,000.00**	**$ 20,000.00**

FEDERAL PARTICIPATION

☒ PARTICIPATING ☐ PARTICIPATING IN PART ☐ NONE

☐ NONPARTICIPATING (Maintenance) ☐ NONPARTICIPATING

FEDERAL SEGREGATION (If more than one funding source or P.I.P. type)

☐ CCO FUNDED PER CONTRACT ☐ CCO FUNDED AS FOLLOWS

FEDERAL FUNDING SOURCE	PERCENT

For detailed information on preparing the draft district director determination of claims, see Section 5-413, "District Director Determination of Claims Preparation and Guidelines," of the *Construction Manual.*

The construction claim findings and the draft district director determination of claims must be sent to the deputy district director of construction by day 220 for consideration.

Prepare and obtain approval of a contract change order compensating the contractor for claims determined to have merit based on the construction claim findings. The contract change order must state that the payment is for full resolution of the claim specified.

Reflect the additional working days in the request for any semifinal payment estimate if the contractor is granted additional working days beyond those shown on the proposed final estimate. For information on time extensions, refer to Section 3-8, "Prosecution and Progress," of the *Construction Manual*.

5-405H District Director Determination of Claims—Target Day 230

The deputy district director of construction finalizes and approves the construction claim findings. The deputy district director of construction forwards the approved construction claim findings and the draft determination of claims to the district director for consideration.

The district director determination of claims is the final determination of claims, and completes the claims resolution process. The district director determination of claims should be delivered to the contractor no later than 230 days after contract acceptance.

The district director finalizes and approves the determination of claims. The district construction claims engineer sends the approved determination of claims to the contractor by day 230. The district construction claims engineer requests that the resident engineer prepare and obtain approval of unilateral contract change order for the final payment in consideration of the district director determination of claims.

Submit a request for the final estimate after preparing and obtaining approval of the contract change order. Other than forwarding the final estimate with a cover letter to the contractor, no further contact or discussion is necessary with the contractor.

District construction issues the final estimate within 30 days of issuing the district director determination of claims. For information on the final estimate cover letter, see Section 3-914, "Final Estimate," of the *Construction Manual.*

The district must store all project records in accordance with the procedures outlined in Section 5-104, "Final Construction Project Records," of the *Construction Manual.*

If the contractor has diligently pursued and exhausted the administrative procedures specified in the contract, the contractor is entitled to file for arbitration of its claims 240 days after contract acceptance, even if the district director determination of claims has not been issued. If 240 days has elapsed since the acceptance of the contract, and a final determination on all claims has not been issued, the district must consult with the Division of Construction field coordinator and the Legal Division on how to proceed.

For more information regarding the arbitration process, refer to Section 5-409, "Arbitration," of the *Construction Manual*.

5-406 5-406 Claim Payments

Claim Payments

Make payments as described below and in accordance with Table 5-4.4, "Delegation of Authority," of the *Construction Manual*. For detailed information on contract payments, refer to Section 3-9, "Measurement and Payment," of the *Construction Manual*.

5-406A Claim Payments Based on Entitlement

If all claims are resolved before a board of review meeting, issue and obtain approval of the contract change order for the claims resolution, and request the issuance of the final estimate.

If only some of the claims are resolved, issue and obtain approval of the contract change order for those claims that have been resolved, and process a semifinal estimate.

5-406B Claim Payments Based on Negotiated Settlements

Negotiated settlements of claims may arise when both Caltrans and the contractor contributed to the disputed issue and total responsibility is difficult to attribute to either party. The district or the board of review will explore the possibility of settlement with the contractor.

Write a draft claim settlement report before presenting a negotiated settlement offer to the contractor. The draft claim settlement report must include the following items:

- A background of the contract and claims
- The scope of the settlement, including terms and conditions
- Identification of the specific claims or potential claims to be settled
- Compromises made in the best interest of Caltrans
- Reasons for the compromises
- Consequences of not settling
- Method of payment

Table 5-4.4, "Delegation of Authority," of the *Construction Manual* lists requirements for recommendations and approvals of a claim settlement report. After approval, present the negotiated settlement offer to the contractor. Prepare and obtain approval of a contract change order if the contractor agrees to the negotiated settlement offer. The contract change order memorandum must reference the corresponding claim settlement report. Do not substitute a contract change order memorandum for a claim settlement report. The contract change order must state that the contractor accepts the compensation provided for in the contract change order as full resolution and settlement of the claim. The contractor must sign the negotiated settlement contract change order.

The claim settlement report is an internal document and must not be given to the contractor or included in the project files. File the original claim settlement report in Division of Construction's confidential files. Destroy all hardcopies and electronic drafts once the final claim settlement report has been approved. Do not distribute copies of the final claim settlement report.

Section 1 Environmental Rules and Requirements

7-101 General

7-102 Sources of Information

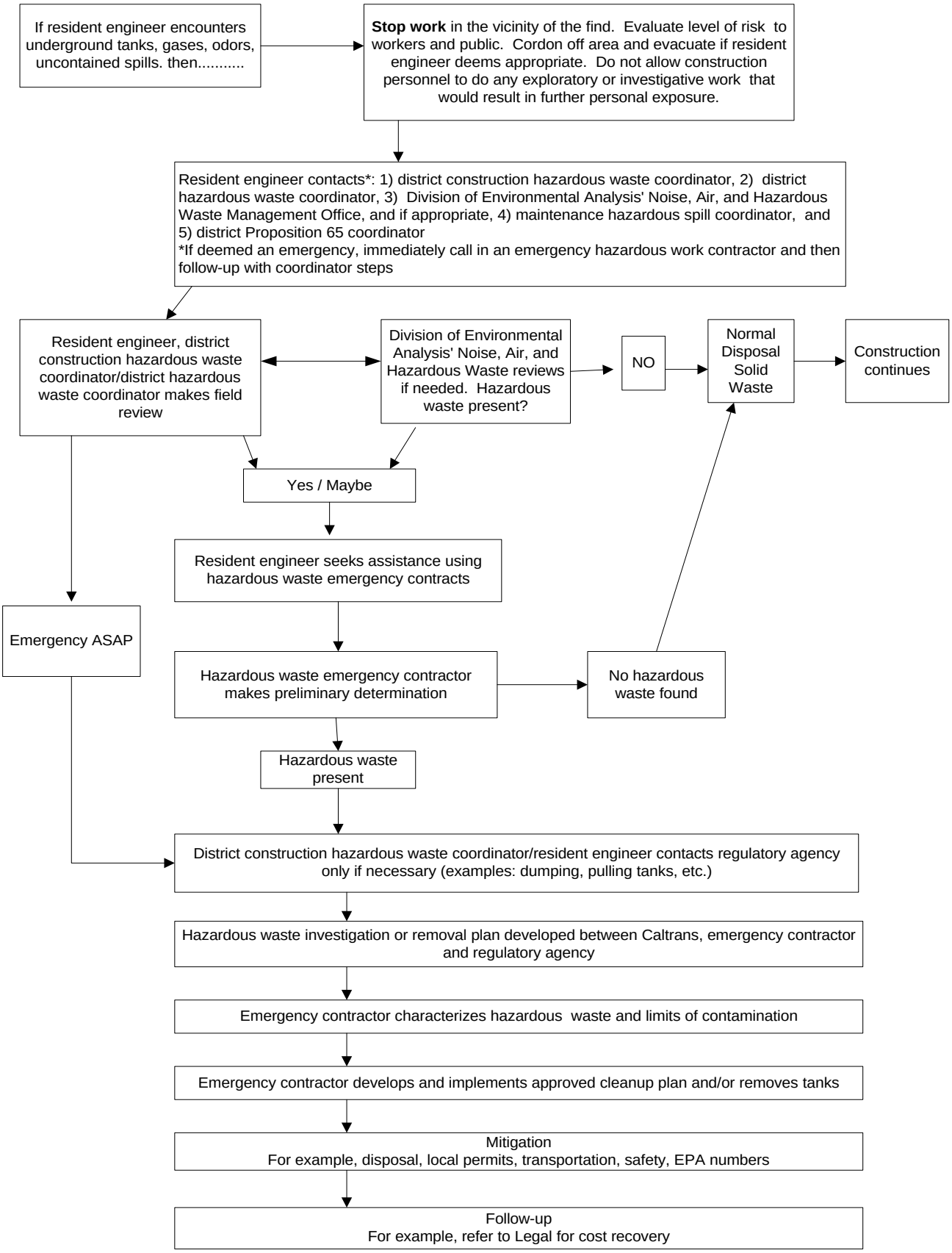
7-103 Protection of Environmental Resources

7-104 Air,Water, and Noise Pollution Control

7-105 Permits

7-106 Environmental Hazards and Safety Procedures

Table 7-1.1 Unknown Hazards Procedures



7-108 Certification of Environmental Compliance

A Certificate of Environmental Compliance (CEC) is prepared at the end of the project to document the mitigation monitoring and reporting program required under the California Environmental Quality Act for every construction project unless no mitigation measures were identified or undertaken. This requirement is shown in Section 270.50 of the *Guide to Caltrans Capital Work Breakdown Structure*. The basic purpose of the CEC is to certify that the mitigation measures were implemented in accordance with the contract.

The resident engineer is responsible for ensuring that the CEC is prepared and distributed. The CEC lists all mitigation measures for the project and includes a discussion of:

- The effectiveness of the constructed mitigation measures;
- Whether the mitigation measures were met and, if not, what measures were implemented;
- How well the contract specifications satisfied all environmental commitments and concerns; and
- Additional mitigation measures required as a result of project changes along with their outcomes.

If an Environmental Commitment "punch list" was prepared, this list can serve as the basis for the CEC documentation.

The CEC will need to be signed by all responsible parties including the Environmental Generalist, the Project Manager, and the Resident Engineer. If the District has an Environmental/Construction Liaison, then this person should also sign the CEC.

The CEC must be sent to the State Office of Planning and Research (1400 Tenth Street, Sacramento 95814) for review and filing. Copies of the CEC are to be provided to all of the district or regional organizational units responsible for the project including Environmental, Design, Project Management and Construction.

The CEC is to be fully discussed at the project close out meeting as it sets forth the lessons learned on the project and it identifies areas in environmental compliance that may need improvement.

7-109 Solid Waste Disposal and Recycling Reporting

Contracts containing special provisions for solid waste disposal and recycling reports require the contractor to chronicle landfill disposal and material recycling activity performed through the duration of the contract. The contractor reports this information via the Division of Construction Form CEM-2025, "Solid Waste Disposal and Recycling Report."

The contractor submits the annual report to the resident engineer by the 15th day of January, and five days following contract acceptance. If no work was conducted during the reporting period, the report states no work was performed during that period.

Contract special provisions require that all reports be received from the contractor in good order before the contract can be finalized. Review all reports submitted by the contractor for accuracy. Compare the total volumes of materials taken to, and diverted from, landfills from the Solid Waste Disposal and Recyclying Reports with the approximate volume of work requiring the removal of materials. Before approving each report, resolve any discrepancies in material type or volume with the contractor. Each report submitted by the contractor that is either delinquent or grossly inaccurate is subject to a deduction of $10,000 (ten thousand dollars) for non-compliance.

Submit the approved Solid Waste Disposal and Recycling Reports directly to the district recycling coordinator and a copy to the statewide recycle coordinator in the Division of Design. District and statewide recycling coordinators contact information is available via the following Internet address:

http://www.dot.ca.gov/hq/oppd/ab75/coordinators.htm

9-103A Requesting Additional Funds for Local Federal-aid (Subvention) Projects

If the project is funded in whole or part with local federal-aid funds, and the resident engineer determines that additional funds are needed, the resident engineer follows the procedures outlined in Section 5-203, "Obtaining Additional Funds," with the following changes:

- The meeting with the resident engineer, construction engineer, construction field coordinator, and project manager to discuss funding needs and alternatives shall also include the district local assistance engineer and a representative of the local agency that sponsored the project. The meeting should include a representative of the local Regional Transportation Planning Agency (RTPA) if the local federal-aid funds are programmed by the RTPA. The meeting should include the Federal Highway Administration transportation engineer for full oversight projects.
- The memorandum to request additional funds will be processed through the RTPA or district local assistance engineer. The meeting participants decide who receives the memorandum.
- If state funds are funding part of the project costs, the meeting will determine the responsibilities for the additional funds request. Project managers process the request for additional state (STIP, IIP, SHOPP and Minor) funds as outlined in Section 9-103B. The request for additional local federal-aid funds will be processed as determined at the meeting.

9-103B Requesting Additional Funds for Locally Funded Projects

If the project is not funded by local federal-aid funds, and the resident engineer determines that additional funds are needed, the resident engineer follows the procedures outlined in Section 5-203, "Obtaining Additional Funds," with the following changes:

- Include a representative of the local agency that sponsored the project when discussing funding need and alternatives durng the meeting with the resident engineer, construction engineer, construction field coordinator, and project manager.
- Send the memorandum to request additional local funds to the local agency.
- Determine the split on the responsibility for the additional funds request during the meeting, if state funds are funding part of the project costs. Project managers process the request for additional state (STIP, IIP, SHOPP and Minor) funds as outlined. The request for additional local funds will be processed as determined at the meeting.

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