STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

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The 2001 edition of the Caltrans *Construction Manual* (manual) supercedes in authority the procedures contained in all previous editions issued by the California Department of Transportation. Since the last complete revision of the manual there have been many changes and improvements in Caltrans construction administration policy. In this edition of the manual, obsolete policies and procedures have been replaced with new ones consistent with current practice. In addition, all Construction Procedure Bulletins (CPBs) through January 2001, have been incorporated into the revised manual. Supplementary CPBs will be issued from time to time as conditions require.

The manual has been carefully reorganized to reflect, as much as possible, the general organization of the *Standard Specifications*. Chapters are now organized to logically lead the user through the general process of contract administration. For quick reference, an outline of many sections has been included at the beginning of those sections, and the major headings are shown in the outside margin of each page.

The manual covers topics in two general areas:

1. Policies and procedures related to the duties of Caltrans construction personnel. This topic includes internal policies and procedures for the following areas:

   - Safety
   - Training
   - Acquiring and using resources
   - Public relations
   - Coordinating with other Caltrans units and outside agencies and organizations

2. Construction contract administration. This topic includes the following areas:

   - Making timely and accurate contract payments
   - Ensuring and documenting the contractor's compliance with contract requirements

The manual uses the *Standard Specifications* and some of the more frequently used special provisions as the basis for contract administration instructions and guidelines. Before attempting to apply these instructions and guidelines, the field engineer must have a thorough understanding of the specifications and other contract requirements.

The manual contains many references to other publications and documents, including other departmental manuals and publications. However, we have made a concerted effort to minimize any repetition of information found in other publications.

Below are the chapter titles and a brief synopsis of the information contained in the revised chapters:

- Chapter 1 –Caltrans Construction Organization
  This chapter provides construction personnel with an overview of the manual, and contains information in the areas of construction organization, public relations, personnel development, facilities and equipment, and field expenses and purchases.

- Chapter 2 –Safety and Traffic
  This is a new chapter, which encompasses the sections of the former manual including 1-60, "Safety," and 2-30, "Traffic," among other policies and procedures that have been developed since the last manual revision.

- Chapter 3 –General Provisions
  For the most part, this chapter consists of Chapter 2, "Contract Administration," of the former manual, but it has been reorganized to closely follow the "general provisions" of the *Standard Specifications*.

- Chapter 4 –Construction Details
  This was previously Chapter 6 of the former manual. This chapter covers the construction details portion (Section 10 through Section 95) of the *Standard Specifications*.

- Chapter 5 –Contract Administration
  This new chapter is designed to lead construction personnel through the contract administration process. Sections included in this Chapter are the former Chapter 3, "Project Records and Reports," former Section 2-50, "Contract Change Orders," and former Section 2-70, "Protests, Potential Claims, and Claims."

- Chapter 6 –Sampling and Testing
  This chapter was previously Chapter 8 of the former manual.

- Chapter 7 –Environmental
  This is a new chapter, which is made-up of various environmental pieces of the former *Construction Manual*. Also, this chapter includes the previous *Caltrans Storm Water Quality Handbooks – Construction Staff Guide*.

- Chapter 8 –Employment Practices
  This chapter was previously Chapter 9 of the former manual.

- Chapter 9 –Projects Funded by Other Agencies
  This chapter was previously Section 2-90 of the former manual. It describes local assistance projects and projects funded by others.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Construction Manual

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State of California -- Department of Transportation

CONSTRUCTION MANUAL

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Construction Manual Overview

1-001 Purpose

1-001 Purpose

When applying Caltrans policy to the administration of construction contracts, knowing how to not only interpret contract documents and plans but also apply engineering experience and judgement is extremely important. The *Construction Manual* (manual) cannot replace this valuable experience and judgement.

Caltrans intends this manual as a resource for all personnel engaged in contract administration. The manual establishes policies and procedures for the construction phase of Caltrans projects. However, this manual is not a contract document. It imposes no obligations or requirements on contractors. Resident engineers and other Caltrans personnel who administer Caltrans contracts must never attempt to use the manual as a substitute or supplement to the specifications and other contract requirements.

1-002 Scope

1-002 Scope

The manual covers topics in two general areas:

1. Policies and procedures related to the duties of Caltrans construction personnel. This topic includes internal policies and procedures for the following areas:
   - Safety
   - Training
   - Acquiring and using resources
   - Public relations
   - Coordinating with other Caltrans units and outside agencies and organizations
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1-003 Format

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1-004 Changes

1-004 Changes

The Division of Construction issues Construction Procedure Bulletins (CPBs) to change policies and procedures. CPBs supercede any conflicting information, guideline, or instruction in the manual.

Be alert for new or revised specifications that may affect the current manual guidelines for contract administration. As specifications, practices, procedures, and policies change, CPBs will be issued. From time to time, subsequent revisions will be made to the manual.

If you find that a policy contained in this manual is unclear or has been superceded and no CPB has been issued covering the changed policy, you can use the following procedure to recommend a manual change:

- Complete Form CEM-9001, "Construction Manual Proposed Change," and send it to the Division of Construction manual coordinator. Explain the reason for the proposed change, and attach a draft of the proposed revision.
- The Division of Construction will review the proposed change and make a decision regarding any future revision.

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Section 1 Construction Organization

Section 1 Construction Organization

1-101 General

1-101 General

In accordance with the Government Code, the powers and duties of Caltrans include constructing transportation systems.

The Streets and Highways Code directs Caltrans to lay out and construct all state highways between the termini designated by law and on the locations determined by the California Transportation Commission. This code also authorizes Caltrans to enter into those contracts that are required for Caltrans to perform its duties.

The Caltrans director has delegated to the deputy director of Project Delivery various responsibilities for administering construction contracts. In turn, the deputy director of Project Delivery has delegated many of these responsibilities to the Division of Construction chief.

In addition, the majority of Caltrans construction contracts receive federal aid. Consequently, federal regulations take precedence over state law and Caltrans policy.

1-102 Division of Construction Organization

1-102 Division of Construction Organization

The following are the responsibilities of various personnel in the Division of Construction.

1-102A Division of Construction Chief

The Division of Construction chief leads the program to deliver quality transportation products and services. The Division of Construction chief does the following:

- Establishes the division's direction, definition, policies, and objectives.
- Develops and uses performance measures to determine program efficiency and effectiveness.
- Acts as a consultant to the districts and service centers.

1-102B Office Chiefs and Staff

Within the Division of Construction, office chiefs and their staff assist in the following:

- Developing and improving program performance measures.
- Providing reviews to document the understanding and application of processes for administering contracts.
- Providing expert assistance on complex and sensitive contract administration issues.

Office chiefs and their staff collaborate with the construction industry and other stakeholders to improve the administration of construction contracts.

1-102C Construction Field Coordinator
Construction field coordinators are responsible for the following:

- Counseling assigned districts on Division of Construction policy.
- Validating that district construction contracts are administered fairly and in good faith.
- Advising district construction managers on complex and sensitive issues in construction contracts.

1-103 District Construction Organization

1-103 District Construction Organization

A district must manage all construction contracts in accordance with statutory requirements, Caltrans directives, and Division of Construction policies.

The following include the responsibilities of various district personnel for administering construction contracts:

1-103A District Director
Within district boundaries, the district director must efficiently administer and operate the Caltrans construction activities within the district.

1-103B District Construction Deputy Director
The district construction deputy director must execute the Caltrans construction activities within district boundaries. The duties of the position include the following:

- Planning and directing the activities of the district construction division.
- Budgeting for personnel and other resources as necessary to administer contracts and provide for the work's integrity and safety.
- Obtaining and providing training for all activities related to contract administration and construction engineering.
- Ensuring district construction complies with statutory requirements, Caltrans directives, and Division of Construction objectives.
- Coordinating construction activities with other district functions.
- Recommending to the Division of Construction chief revisions to the policies and procedures outlined in the *Construction Manual* (manual).

1-103C Construction Manager
In districts with large construction programs, the construction manager must execute within district boundaries the assigned portion of Caltrans construction activities. The duties of the position include the following:

- Budgeting for personnel and other resources necessary to administer contracts.
- Obtaining and providing training for all activities related to contract administration and construction engineering.
- Coordinating construction activities with other district functions.

1-103D Construction Engineer
The construction engineer must execute the portion of Caltrans construction activities assigned and is accountable for the performance of the assigned construction employees. The duties of the position include the following:

- Supervising assigned personnel.

- Ensuring adequate training for assigned personnel.
- Ensuring that materials and completed work comply with plans, specifications, and design criteria.
- Approving (or not approving) a resident engineer's recommendation for contract change orders and time extensions.
- Ensuring that the maintenance of project records complies with this manual.
- Ensuring the performance of all safety-related activities.
- Ensuring compliance with regulations and specifications related to labor and civil rights.
- Collaborating with the district's project development unit on constructability reviews and providing expert assistance on construction matters for design and traffic engineers.
- Ensuring that the practice of civil engineering on assigned contracts complies with the Professional Engineer's Act.

1-104 Office of Structure Construction Organization

1-104 Division of Structure Construction Organization

The Office of Structure Construction is responsible for the technical control of structure work. Engineers from the Office of Structure Construction are assigned to all districts to provide field engineering for structures. The district may request that the assigned structure representative act as the resident engineer where structure work predominates.

The Office of Structure Construction has the ultimate responsibility and authority for decisions relating to the structural adequacy of contract work on structures.

1-104A Office of Structure Construction, Chief

For construction contracts, the Office of Structure Construction, Chief, must uniformly execute statewide structure construction services to the districts. The duties of the position include the following:

- Planning and directing the activities of the statewide division.
- Budgeting for structure construction personnel and other resources, as necessary, to administer contracts.
- Obtaining and providing training for all engineering activities for structure construction.
- Ensuring that statewide structure construction complies with regulations, Caltrans policies, and program objectives.
- Coordinating the activities of structure construction statewide with all district functions and with other Engineering Services functions.
- Recommending to the Division of Construction chief, revisions in the Division of Construction's policies and objectives.
- Producing and distributing policies and procedures for inspecting and administering structure construction work.

1-104B Area Structure Construction Manager

The area structure construction manager is responsible for the structure construction staff within a designated area of the state. The area may include one or more districts or a portion of a metropolitan area or district. The duties of the position include the following:

- Assigning structure construction staff within the manager's assigned area, including approving requests to assign structure engineers to act as resident engineers on projects.
- Obtaining and providing adequate training for all structure construction staff within a designated area.
- Advising and assisting the district about contract change orders and claims involving structure work.
- Providing the structure construction headquarters in Sacramento with status information on all contracts within the manager's area.
- Informing the district managers of structure construction activities within their areas.

1-104C Structure Construction Engineer

The structure construction engineer must execute the structure portion of construction projects and is accountable for the performance of assigned structure construction employees. The duties of the position include the following:

- Supervising the activities of structure construction personnel.
- Ensuring adequate training for assigned structure construction personnel.
- Collaborating with Engineering Services and the district's design unit on constructability reviews, and providing expert assistance on structure construction methods.
- Ensuring structure materials and completed structure work generally comply with the contract plans, specifications, and design policies.
- Providing concurrence and advice to the district for contract change orders and time extensions on structure work items.
- Ensuring and verifying that the maintenance of project records complies with the manual.
- Ensuring the performance of all safety-related activities.
- Ensuring that the practice of civil engineering on contracts in the assigned area complies with the Professional Engineer's Act.

1-105 Construction Project Organization

1-105 Construction Project Organization

The number of state personnel required on a contract varies with the particular circumstances involved. A resident engineer may be assigned to a single contract or may be assigned as resident engineer over several contracts. Field office assistants, assistant resident engineers, and other support personnel are assigned as necessary.

The district must obtain maximum efficiency on the project with a minimum number of personnel. This expectation means that all personnel must have adequate training.

Depending on the project size, a full-time office assistant may be assigned for the clerical work.

In some instances, several smaller projects may be grouped together and administered from a single field office, making it possible to employ full-time clerical office assistants.

Personnel furnished by engineering consultants may be assigned to the project as assistant resident engineers. The resident engineer must be familiar with the terms of the engineering consultant contract. The resident engineer must also monitor the performance of the consultant personnel.

1-105A Using Personnel From the Office of Structure Construction

When structure work predominates, the districts may use structure construction personnel as resident engineers. Upon district request, the Office of Structure Construction will select staff acceptable to the district as resident engineers.

All resident engineers, whether from the Office of Structure Construction or district personnel, report and act through the district.

To ensure optimum use of combined district and structure construction personnel, the project personnel may be interchanged freely when conditions require, particularly when work load varies because of temporary overstaffing or understaffing. In such instances, the resident engineer and the structure representative will assign personnel through agreement with each other. In making their assignments, they will consider the responsibility of structure personnel for the technical control of structure work.

Because of the specialized training of structure and transportation personnel, prolonged use of either in the work of the other must be avoided.

1-105B Resident Engineer

Under the general direction of a construction engineer, the resident engineer is responsible for the contract administration and construction engineering of all assigned projects. As a Caltrans representative, the resident engineer acts within the authority of the following:

- The State Contract Act
- Section 5-1.01, “Authority of the Engineer,” of the *Standard Specifications*
- The manual
- Any other applicable administrative instructions

The construction engineer is the resident engineer’s counselor on the intent and application of any portion of the contract. On complex or sensitive construction issues, the resident engineer and construction engineer should consult with the construction field coordinator.

A registered professional engineer must be responsible for the engineering integrity of a construction project. If the resident engineer is not registered as a professional engineer, this person must defer to the construction engineer any decisions and actions that constitute the practice of civil engineering, as defined by the Professional Engineer’s Act.

Selecting a person to act as resident engineer is dependent upon the following:

- The work’s magnitude and complexity
- The type of work
- The degree of independent control and direction to be exercised

Only the person best qualified for a specific project should be selected as the resident engineer.

The civil service classification of a resident engineer is related to the project's size and complexity as well as to the staff size required to properly administer the assigned contract or contracts. Normally, the person selected as resident engineer will be a registered professional engineer at the transportation engineer level. On complex projects (or a group of projects) that require a large staff to monitor the contractor's operations, a senior level engineer may be necessary. On more routine contracts that do not involve civil engineering decisions and where the construction engineer is readily available, the resident engineer may be an unregistered experienced transportation engineer. Complexity, rather than monetary value, governs the assignment of resident engineers.

The resident engineer must thoroughly study the assigned project, becoming familiar with all its facets. The resident engineer must analyze the plans, estimate, and preliminary quantity calculations, and determine if the estimated quantities cover all work items contemplated. If the resident engineer discovers any major discrepancies, the engineer must take appropriate action. The resident engineer must also thoroughly study the requirements of environmental commitments and permits, including pollution and erosion control plans.

If it becomes apparent at any time that the probable unobligated balance of funds, with due regard for the amount of work remaining, is not sufficient to complete the project, the resident engineer must bring the situation to the supervisor's attention. To permit contract expenditures to overrun allotted funds seriously reflects on the resident engineer's ability. For the procedure for obtaining additional funds, see Section 5-203, "Obtaining Additional Funds,"of this manual.

Once assigned, the resident engineer should remain on the project until its completion, including the completion of all project documents and administrative matters.

1-105C Structure Representative

Under the general direction of a structure construction engineer, the structure representative must inspect, document, and field test materials for all structure work on a project. As a service to the resident engineer, the structure representative will also provide claim positions and draft contract change orders. As a representative of Engineering Services, the structure representative acts within the authority of the following:

- The State Contract Act
- The *Standard Specifications*
- The manual
- The *Bridge Construction Records and Procedures Manual*
- Other applicable administrative instructions

Under the general direction of a construction engineer and a structure construction engineer, the structure representative must administer all assigned contracts. When acting as a resident engineer, the structure representative has authority commensurate to this responsibility.

The structure representative acting as resident engineer should consult the construction engineer whenever the structure representative is unsure about the intent and application of any portion of the contract.

The person responsible for the structural integrity of a construction contract must be a registered professional engineer. If the structure representative is not registered, that person must defer to the structure construction engineer any decisions and actions that constitute the practice of civil engineering, as defined by the Professional Engineer's Act.

1-105D Assistant Resident Engineer

The assistant resident engineer must ensure the performance of assigned work complies with the requirements of the plans, *Standard Specifications*, and special provisions. The duties of the position include the following:

- Ensuring the contractor complies with all contract requirements.
- Performing, or calling for, required tests to ensure work quality.
- Keeping complete, accurate, and concise records of the work and quantities.
- Keeping the resident engineer informed of work progress and problems.
- Responding to any contractor questions about plans and specifications. The assistant resident engineer must not direct the contractor's work but must immediately notify the contractor when work is not in compliance.
- As a representative of Caltrans, acting professionally at all times.
- Working effectively by knowing construction methods and inspection techniques.

1-105E Office Assistant

The office assistant must maintain complete and accurate project records. These records may include the following:

- Monthly progress pay estimates
- Extra work reports
- Contract change orders
- Labor and equipment records
- Correspondence
- Personnel records

When these duties do not result in full-time work, the office assistant may be assigned to check quantity calculations.

Once assigned, the office assistant should remain on the project until its completion.

1-105F Specialists and Coordinators

The complexity of many Caltrans projects has resulted in the use of many district specialists and coordinators. These include the following:

- Materials and plant specialists
- Weights and measures coordinators
- Survey coordinators
- Labor compliance and civil rights personnel
- Safety coordinators
- Traffic handling, signing, and electrical specialists

- Landscape specialists
- Environmental personnel
- Schedule analysts
- Claims engineers

In the absence of a Caltrans policy on any specific job problem, the authority of the resident engineer will prevail over that of a specialist or coordinator.

1-106 Local Projects

1-106 Local Projects

Local construction projects are either "State Administered," "Locally Administered," or "Administered by Private Sponsor." For the responsibility of state personnel on local projects, see Chapter 9, "Projects Funded by Other Agencies," of this manual.

Section 2 Public Relations

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1-202B The Resident Engineer and the District

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1-205 Relations With Property Owners

1-206 Relations With the General Public

Section 2 Public Relations

Section 2
Public Relations

1-201 General

1-201
General

The subject of public relations can be divided into the following categories:

- Internal relations among Caltrans personnel
- Relations with the contractor
- Relations with utility companies and other public agencies
- Relations with property owners
- Relations with the general public

1-202 Relations Among Caltrans Personnel

1-202
Relations Among
Caltrans Personnel

Within Caltrans, public relations can be divided into two subcategories: 1) relations between the resident engineer and staff and 2) relations between the resident engineer and the district.

1-202A The Resident Engineer and Staff

Development and maintenance of good relations between Caltrans personnel is largely a matter of adequate communication and a clear division of responsibility. Employees must know precisely what their responsibilities are, and they must be given the authority to handle these responsibilities.

The most important communications are between project personnel and the resident engineer. It is recommended strongly that resident engineers hold short staff meetings each workweek. At these meetings the resident engineer should brief assistant resident engineers on the week's operations, announce any changes or new assignments of responsibility, and discuss any other pertinent subjects.

Resident engineers should provide personnel with an opportunity to demonstrate their strongest capabilities and highest capacity for responsibility. The resident engineer should ensure that assistant resident engineers have an opportunity to gain experience in the various construction phases.

Assignment rotation is encouraged as long as the effectiveness of the overall operation does not suffer. Similarly, if feasible, assign personnel to operations different from those handled on previous projects. Newly assigned personnel should study the application portions of the *Standard Specifications*, special provisions, the plans, this *Construction Manual*, and any other applicable publications of Caltrans. An individual should not be required to perform new duties until the resident engineer is assured that the person is capable of performing them correctly and effectively.

1-202B The Resident Engineer and the District

Communication is a two-way responsibility. Resident engineers should adequately inform their supervisors of facts so the supervisors are not embarrassed by learning about project events from outside sources. Conversely, good management practice

requires that supervisors keep their personnel informed of decisions affecting an employee's area of responsibility. Communication has failed whenever a resident engineer first hears about a district decision from outside sources.

An important phase of internal relations is the necessity for working with other functional units within the organization. People in other units do their work with information available to them, just as construction forces do. They, too, have problems in their work. When there is a difference of opinion on some part of the project, whether it is about design, traffic handling, or some other feature, the resident engineer should approach the other party with an open mind to discuss the problem.

1-203 Relations With the Contractor

1-203 Relations With the Contractor

In communicating with the contractor and the contractor's personnel, it is important that the resident engineer take a clear position. It is far better to start on a basis of administering the contract firmly in accordance with the plans and specifications than it is to correct a situation caused by laxity later in the contract's life. The employees assigned to construction must have a thorough knowledge of the plans and specifications governing the contract. Clear evidence of possession of this knowledge will go a long way in promoting smooth relations with the contractor's personnel. If the resident engineer and assistant resident engineers know the plans and specifications thoroughly, the contractor's personnel will respect the resident engineer's judgment in cases where interpretation becomes necessary. A satisfactory relationship between Caltrans and the contractor at all levels is an important result of smooth relations between the resident engineer and the contractor's superintendent.

Proper and ethical contract administration requires the exercise of several essential attributes. Ideally, resident engineers and assistant resident engineers should be experienced, resourceful, and considerate, in addition to having a thorough knowledge of the specifications and the work to be done.

Numerous collateral duties are also included in contract administration. These duties, which are equally as important as good engineering, include the following: competent record keeping, well-monitored personnel activities, enforcement of labor laws, and oversight of safety.

The primary responsibility, however, is to ensure that the rights of both Caltrans and the contractor are equally and impartially enforced. The taxpayers are entitled to what they pay for, and the contractor is entitled to payment for constructing the work as defined by the contract.

In general, there are two types of specifications: "end-result" and "method." For work governed by end-result specifications, the engineer determines "what" and the contractor decides "how."

Method specifications are more restrictive as to the contractor's options. Deviations from specified methods require contract change orders. Deviations must also provide equal or better results while preserving the contract's integrity. Finally, the rights of unsuccessful bidders must be protected.

If any doubt exists about a contractual matter, the resident engineer has an obligation to clarify in writing the Caltrans' position for the contractor.

1-204 Relations With Utility Companies and Other Public Agencies

1-204 Relations With Utility Companies and Other Public Agencies

Good public relations will have a beneficial effect in dealing with the personnel of utility companies and other public agencies. To make it easier to work with such personnel during the contract's life, the resident engineer should make early personal contact with the appropriate person at the utility company, governmental agency, or department with which Caltrans will be dealing. The resident engineer should establish a good working relationship with local school districts, the Highway Patrol, and local police organizations. Personal contact with the personnel from these agencies, with the resident engineer acquainting them with the operations before actual construction, will enable them to 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.

Section 3 Personnel Development

1-301 General

1-302 District Role

1-303 Supervisor Role

1-304 Individual Duties

1-305 Resources and Budgeting

1-306 Subject Matter, Trainees, and Instructors

1-307 Just-in-Time Training

1-308 Training Methods

Section 3 Personnel Development

Section 3
Personnel
Development

1-301 General

1-301
General

Personnel development is essential for successfully implementing Caltrans' strategic plan, goals, and objectives. Moreover, most construction employees want to learn new job skills. A comprehensive training and development program helps to recruit and retain new construction staff. It is in the best interests of Caltrans to train staff early in their careers, reinforce that training as time passes, and update staff job skills as changes in policy and technology affect the way Caltrans conducts business and serves its stakeholders.

Base staff development needs on Caltrans' fundamental goals and objectives. Design each training and development activity to produce construction personnel who are prepared to perform their essential job duties.

1-302 District Role

1-302
District Role

District construction will do the following:

- Identify training needs based on the following:
  1. The employee's current knowledge and skills
  2. Additional job skills necessary for the employee's success in the current job assignment
  3. Skills the employee will need for future job assignments
- Include training and development planning in each employee's yearly individual development plan.
- Provide each employee with adequate training and development opportunities that will facilitate the implementation of the employee's training and development plan.
- For each construction employee, maintain a historic record of completed training and development sufficient to enable a supervisor to evaluate the employee's construction knowledge and skill level.

1-303 Supervisor Role

1-303
Supervisor Role

Supervisors will do the following:

- Ensure that each employee under their direct supervision is capable of performing the assigned duties.
- Periodically review subordinates' qualifications and use that information when making decisions about new job assignments.

- When evaluating staffing needs and planning job assignments, carefully consider cross-training opportunities for all staff, provided collective bargaining agreements and memorandums of understanding allow such opportunities. A well cross-trained staff has the following abilities:

  1. More flexibility in completing a job
  2. More ability to collaborate
  3. Stronger ability to adjust to changing project conditions

- Establish a succession plan, indicating who will back up the supervisor and the employees when they are absent. Update the plan each year based on staff performance, and ensure the unit training and development plan supports the advancement of interested employees.
- Take immediate action to correct any known deficiency in an employee's capability to perform currently assigned tasks.
- Encourage the development of subordinates, and foster a working environment in which employees are encouraged to learn new job skills.
- Assist employees to participate in external training opportunities requested by the employees. Such training must benefit the employees' professional career development. Ensure the training schedule does not have a significant negative effect on the employees' work. This training must also conform to current departmental guidelines for career related training.

1-304 Individual Duties

1-304 Individual Duties

Each individual employee will do the following:

- As directed by the supervisor, attend training activities and learn the skills and acquire the knowledge necessary to meet the standards for satisfactorily completing job assignments.
- Attend a training class when scheduled to do so.
- Be responsible for evaluating their own ability to perform the essential job duties for each task they are asked to perform. If the individual does not feel properly trained or qualified to execute a specific job task, then that person must notify the supervisor.
- In the planning of activities for training and development, consider future promotional opportunities. Planning for training and development requires the employee to maintain a basic level of knowledge necessary to efficiently perform current job duties and also requires the employee to expand knowledge to include job duties for the next position on the individual's career path.
- Obtain prior approval from the supervisor to attend a training activity.
- Accurately report training expenditures, including filling out the "G" number column on the time reporting system. In addition, for district employees, turn in a copy of a completed Form OT-0300, "Training Request Form," to the district training officer, and for structure construction employees, turn in a copy to the Office of Structure Construction training officer.

1-305 Resources and Budgeting

1-305 Resources and Budgeting

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 of Traffic Controls for Construction and Maintenance Work Zones*
- *Highway Design Manual*
- *Traffic Manual*
- *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 4 Facilities and Equipment

1-401 General

1-402 Resident Engineer Offices
1-402A Commercial Office Space
1-402B Caltrans Facilities
1-402C Trailers
1-402D Maintaining Resident Engineers' Offices
1-402E Field Office Utilities

1-403 Care of Equipment

1-404 Nuclear Gauges

1-405 Automotive Equipment
1-405A Operation of State Vehicles
1-405B Home Storage Permits

1-406 Reporting Losses

Section 4 Facilities and Equipment

Section 4 Facilities and Equipment

1-401 General

1-401 General

This section provides guidelines for the acquisition and the care of facilities and equipment used in Caltrans construction field operations.

1-402 Resident Engineer Offices

1-402 Resident Engineer Offices

District construction must provide offices for resident engineers. Charge the rent and other items and services included in the cost of resident engineers' offices to the phase 4 expenditure authorization as state-furnished material. When an office is used for more than one project, appropriately prorate the charges.

For a description of items and services included in the cost of the resident engineer's office, refer to the *Coding Manual*, Volume I, "Object Code 184." State-furnished material funds may also be used for utilities (Object Code 002) and monthly communications (phones and cell phones, Object Code 025).

Carefully select the field office location. Consider security, and avoid areas, such as residential neighborhoods, where the field office would create a nuisance.

Use service contracts to move furniture and equipment between offices.

1-402A Commercial Office Space

Generally, secure commercial office space only for large or multistage projects. The process to secure approval of a lease for commercial office space takes 90 to 180 days.

Refer any questions concerning commercial property leases to the appropriate district right of way unit.

1-402B Caltrans Facilities

Space in Caltrans facilities, such as district offices or maintenance station buildings, may be available for resident engineer offices.

1-402C Trailers

Where land is available, you may lease commercial office trailers or use Caltrans-owned trailers, if available, for resident engineer offices. Check with the district equipment manager to see if any Caltrans-owned office trailers are available.

Lease commercial office trailers in the same way you would lease commercial office space. Do not rent furnished commercial office trailers. For leasing information, contact the district right of way unit.

You may arrange to place office trailers in maintenance yards or on state highway right-of-way.

1-402D Maintaining Resident Engineers' Offices

The resident engineer must maintain both the interior and exterior of the project office. When more than one resident engineer occupies an office, they must jointly decide on the maintenance responsibilities.

Each member of the resident engineer's staff must routinely maintain neatness in the field facility. This responsibility includes picking up papers, keeping desktops neat, filing papers, and hanging maps.

For janitorial work, you may use service contracts. Lease agreements for commercial office space may already include a janitorial service. The use of janitorial services does not preclude Caltrans personnel from light housekeeping between service periods.

Each resident engineer's field office must display a sign that identifies the office as a Caltrans facility.

1-402E Field Office Utilities

You may use a service contract for field office utility work. For more information, contact the district construction office. If the location is so isolated that electricity is not available, the Division of Equipment can supply skid-mounted generators to supply electrical power for office trailers.

1-403 Care of Equipment

1-403 Care of Equipment

Resident engineers and staff are responsible for the proper care and operation of assigned equipment. District construction must have an inventory process to address equipment assignments and to track moves between offices. Complete an inventory no less than once a year, and reconcile all discrepancies.

Resident engineers must maintain current information on equipment assigned to them and must properly document the disposal or movement of equipment. Report new equipment purchases to the district property controller. Also contact the district property controller for questions about what to include as inventory equipment.

When a member of the resident engineer's staff is not present, always keep the field office locked. Commercial security systems may be warranted for a field office. You can use funds for state-furnished materials to obtain a security system, or a security system may be included in the rental cost for commercial office space. For details, contact the district office.

Annually service fire extinguishers in Caltrans facilities. For guidelines on fire extinguishers, see Section 8.06, "Emergency Action Plan Requirements," of the *Caltrans Safety Manual*.

1-404 Nuclear Gauges

1-404 Nuclear Gauges

Only properly trained and qualified personnel must operate nuclear gauges. Resident engineers and supervisors of nuclear gauge operators must be aware of the requirements for handling nuclear gauges, including transporting and storage. Refer to California Test 121, "Use of Nuclear Gages," for nuclear gauge requirements.

1-405 Automotive Equipment

1-405 Automotive Equipment

District construction assigns vehicles to field personnel. The resident engineer or the construction engineer will determine the use of vehicles at the project level with due consideration for the needs of the Office of Structure Construction's personnel. To accomplish the work, vehicles may be exchanged at the project level as necessary.

1-405A Operation of State Vehicles

For policies, guidelines, and rules for driver training and the safe operation of motor vehicles, refer to Chapter 17, "Motor Vehicle Safety," of the *Caltrans Safety Manual*.

Section 9-09, "Requirements for First Aid Medical Supplies" of the *Caltrans Safety Manual* requires a 10-unit first aid kit to be at each construction crew field site. To satisfy this requirement, each vehicle must carry a first aid kit.

For reporting accidents, see the procedures in Chapter 18, "Motor Vehicle Accidents," of the *Caltrans Safety Manual*. Chapter 18 requires that each vehicle carry Form STD. 269, "Accident Identification Card."

You may obtain supplies and repairs for vehicles from the Division of Equipment facilities. In case of breakdown, contact the nearest Division of Equipment facility. Also, each vehicle contains a directory that lists the shops and personnel to contact in case of a vehicle breakdown or emergency on the road. Roadside assistance is also available 24 hours a day with the use of the official state credit card for fuel. Each vehicle must be equipped with the credit card and instructions for obtaining emergency service.

1-405B Home Storage Permits

The California Code of Regulations requires the use of vehicle home storage permits. The director of the Division of Equipment develops, publishes, maintains, and oversees the administration of guidelines for home storage permits. For these guidelines, see the Division of Equipment web page at the following address:

http://issc.dot.ca.gov/EquipServCenter/

The guidelines contain specific requirements for field employees in construction, surveys, material testing, and structure construction.

1-406 Reporting Losses

If theft, burglary, pilferage, or damage by vandalism occurs, immediately notify the individual in the district who is responsible for coordinating the reporting of such incidents. Unless advised not to do so by this district coordinator, notify the local police authorities, giving full details as you know them and complete descriptions of the damaged or missing articles. The district coordinator will advise the resident engineer of any further action.

Also notify the district property controller of any lost, stolen, destroyed, or damaged inventory property. For this purpose, use Form ADM-0396, "Report of Lost, Stolen, or Destroyed/Damaged State-Owned Property."

1-406 Reporting Losses

Section 5 Field Expenses and Purchases

Section 5
Field Expenses
and Purchases

1-501 General

1-501
General

This section of the *Construction Manual* (manual) contains guidelines for paying for travel expenses and obtaining goods and services.

1-502 Travel Expenses

1-502
Travel Expenses

The Division of Accounting Services administers payment for travel expenses that Caltrans employees incur.

Supervisors must ensure employees do not abuse travel expenses. *The Caltrans Travel and Expense Guide*, issued by the Division of Accounting Services, contains instructions and the policy for submitting travel expense claims.

Pay particular attention to the charging information on travel requests and travel expense claim forms. Employees who attend training or work on task forces must obtain from the group coordinator or leader the correct charging information.

1-503 Miscellaneous Purchases

1-503
Miscellaneous
Purchases

Whenever possible, obtain supplies and equipment from district warehouses and stockrooms. Use the procedures established in the district for obtaining these supplies. See the *Caltrans Acquisition Manual*, issued by the Office of Procurement and Contracts of the Division of Administrative Services, for information and guidelines about acquiring the following:

- Commodities
- Supplies
- Equipment
- Furniture
- Information technology products and services

The *Caltrans Acquisition Manual* is available at the following web address:

http://adsc.caltrans.ca.gov/

For items that are unavailable through district warehouses, use commercial vendors. The following two procedures are the most frequently used methods field personnel use for purchasing from such vendors.

<u>1-503A Cal-Cards</u>
Cal-Cards are credit cards used to purchase items that are not available in district warehouses and stockrooms. For guidelines and information about Cal-Cards, see the *Cal-Card Handbook* on the web site of the Office of Procurement and Contracts of the Division of Administrative Services. To use Cal-Cards, use the procedures established by the Office of Procurement and Contracts and the districts.

In general, use the Cal-Card for office and engineering supplies necessary to support the construction project.

1-503B Cash Purchase Transactions

You may make cash purchases of no more than $50 plus tax for the following:

- Incidental supplies not stocked by the district
- Minor emergencies, services, or other nontravel outlays

Typical cash purchases include items such as postage stamps and post office box rental fees. Obtain and submit receipts for all cash purchases.

For obtaining reimbursement for approved purchases, submit Form FA-3202, "Travel Expense Claim," or Form FA-0202, "Cash Expenditure Voucher."

1-504 Services Contracts

1-504 Services Contracts

The resident engineer uses service contracts to obtain services or rent equipment to fulfill construction engineering obligations. For many services, such as repair of office equipment, a master service contract may be in existence. For other services, such as repair of state-owned buildings used for field offices, obtain a specific service contract. Do not use service contracts to purchase supplies or finished articles.

Section 1 Safety

2-101 General

2-102 Duties and Responsibilities
2-102A District Construction Deputy Director
2-102B Construction Safety Coordinator
2-102C Construction Engineer
2-102D Resident Engineer
2-102E Project Safety Coordinator
2-102F Project Staff

2-103 Managing Safety Hazards
2-103A Imminent Hazards
2-103B Dangerous Conditions (Serious Hazards)
2-103C Minor or Nonserious Conditions

2-104 Division of Occupational Safety and Health
2-104A Authority and responsibility
2-104B Citations and Civil Penalties
2-104C Classes of Employers
2-104D Procedures During Division of Occupational Safety and Health Inspections
2-104D (1) Elements of a Cal/OSHA Inspection
2-104D (2) Participation in the Inspection
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2-105 Specific Safe Practices
2-105A Code of Safe Practices
2-105B Tailgate Safety Meetings

2-106 Accident Reports and Investigations

2-107 Safety Precautions for the Public in Construction Areas

2-108 Hazardous Waste

Section 1 Safety

Section 1
Safety

2-101 General

2-101
General

Federal and state laws have established occupational safety and health standards with which all employers must comply. These laws require an employer to provide a safe place of employment that is reasonably free from danger to life or health.

The *Caltrans Safety Manual* is the basis for the official Caltrans injury and illness prevention program. Use the *Caltrans Safety Manual* in conjunction with the *Construction Manual* (manual). The *Caltrans Safety Manual* lists mandatory safety policies and procedures, provides a centralized reference to operational safety advisories, and standardizes instructions related to reporting employee occupational injuries, vehicular accidents, and claims against Caltrans.

Federal Highway Administration (FHWA) requirements and the *Standard Specifications* establish compliance with safety regulations as a condition of the contract. As a contract requirement, compliance with safety regulations is enforceable by contract administration procedures, as are all other specifications.

2-102 Duties and Responsibilities

2-102
Duties and
Responsibilities

The following describes the district's responsibilities for safety on Caltrans construction projects:

2-102A District Construction Deputy Director

The district construction deputy director must ensure that a training program is maintained to acquaint all Caltrans construction personnel with the basics of construction safety.

2-102B Construction Safety Coordinator

The district's construction safety coordinator must act as technical advisor and coordinate the district's administration of contractors' compliance with safety requirements. The construction safety coordinator must also do the following:

- Be familiar with highway construction procedures, equipment, and construction zone traffic management, and also be able to recognize and anticipate unsafe conditions created by a contractor's operation.
- Visit projects periodically to observe the contractor's operation and any traffic conditions affected by construction activity. The frequency of these visits will depend upon the type and complexity of the work. When requested by the resident engineer, the coordinator must make additional visits. However, during the life of shorter contracts, one visit may be sufficient.
- Make a written report of each visit, and file a copy of the report with the project records. The purpose of the visit is not to perform a complete safety inspection, but to observe the contractor's overall efforts and answer questions or look at specific areas as requested by the resident engineer.

- Be the district's primary contact with the Division of Construction safety engineer and the local Division of Occupational Safety and Health (Cal/OSHA), except for emergencies involving imminent hazards.
- Be responsible for administering the district's construction safety training program. Structure the training program to meet the district's needs. This mandatory training must take place at a frequency of a minimum of four hours per employee per year and must be included in the district's annual training plan. Safety training will include orientation training to all employees at the time of their first assignment to construction. Employees returning to construction following an absence of five years or more must also receive safety orientation training.
- Be the advisor for the construction safety portion of the preconstruction conference. If the coordinator does not take part in the discussion, the coordinator must be involved in reviewing the specifications and determining what specific areas of safety will be discussed with the contractor.

2-102C Construction Engineer

The district construction engineer must review construction projects to ensure that the resident engineer is monitoring the contractor's construction safety program adequately and that an effective safety program is being performed. While the construction safety coordinator acts as a technical advisor on construction safety, the construction engineer is responsible for advising the resident engineer on construction safety as it relates to contract administration.

District construction engineers are also accountable for the performance of employees under their supervision. They should document their reviews of employee safety programs.

2-102D Resident Engineer

The resident engineer must ensure that the contractor complies with all aspects of the contract including the applicable *Construction Safety Orders*. In doing do, the resident engineer must also do the following:

- Identify an unsafe condition as well as the specific regulation involved, if known. Under no circumstances instruct the contractor verbally or in writing on how to correct a deficiency.
- In a special safety report using Form CEM-4601, "Assistant Resident Engineer's Daily Report," document the construction safety activities of both the contractor and Caltrans project personnel. At least weekly, complete this report and file it in Category 6, "Safety," of the project records.
- Ensure the contractor complies with all safety orders through normal contract administration procedures. The state-enforcing agency for safety regulations is Cal/OSHA.
- Give project safety deliberate attention, both at preconstruction conferences and throughout the duration of the contract. In the project files, document safety discussions at preconstruction conferences and cover at least the following items:
    1. The contractor's accident prevention program required by Cal/OSHA.
    2. The contractor's code of safe practices, also required by Cal/OSHA. This code must be developed for each contract and reviewed by either the resident engineer or the construction safety coordinator.
    3. Various permits that may be required before starting specific work items, such as excavation, trench shoring, falsework, and scaffolding.

4. Other safety items that may be pertinent to the contract, related to items such as blasting operations, work in confined spaces, personal protective equipment, back-up alarms, rollover protective structures, traffic control, and access to elevated work.

5. The reporting of disabling or fatal accidents to the resident engineer and Cal/OSHA.

6. The contractor's safety training program.

- Develop the code of safe practices for the project and ensure they are followed.

2-102E Project Safety Coordinator

The resident engineer may delegate safety responsibilities to an assistant who will act as the project safety coordinator. Usually this delegated work will be in addition to other assigned duties, but on large contracts it may be full time. The project safety coordinator must monitor and document the contractor's compliance with safety requirements and must keep the resident engineer informed. The project safety coordinator also acts as a safety advisor to Caltrans project personnel.

2-102F Project Staff

Caltrans does not intend that the resident engineer and the project safety coordinator carry the total load of monitoring the contractor's construction safety activities. All construction personnel must consider the safety of the operations in conjunction with their normal inspections.

2-103 Managing Safety Hazards

2-103 Managing Safety Hazards

In carrying out Caltrans' responsibilities for ensuring safety compliance as a contract requirement, use the following guidelines:

2-103A Imminent Hazards

Imminent hazards are dangerous conditions that, if not corrected, would likely result in an accident causing severe or permanently disabling injury, or causing death. When an imminent hazard is found to exist or when the contractor permits repeated occurrences of a hazardous condition, the resident engineer must take the following steps:

- Immediately advise the contractor verbally of the condition and the need for immediate correction.
- Remove all Caltrans and consultant employees from the hazardous exposure.
- Order the contractor to remove all personnel not needed to make the corrections.
- If the contractor complies, document the incident in the project's safety report with appropriate references in the resident engineer's daily report.
- If the contractor does not comply, suspend the affected operation. Confirm the suspension order with written notice to the contractor.
- Document the incident and the action taken in the resident engineer's daily report.

Whenever it is necessary to suspend a contractor's operation, notify the construction safety coordinator and Cal/OSHA of the hazardous condition and the actions taken. By fax, e-mail, or telephone, notify the Division of Construction safety engineer of the actions taken. Safety reports, giving all details leading up to the suspension, and copies of orders by the resident engineer, Cal/OSHA, or both, must be placed in Category 6, "Safety," of the contract files.

2-103B Dangerous Conditions (Serious Hazards)

Dangerous conditions (sometime referred to as serious hazards) are those that do not present an immediate danger to workers, but if not corrected could result in a disabling injury and possibly death, or could develop into an imminent hazard. When a dangerous condition is found to exist, the resident engineer must take the following steps:

- Advise the contractor verbally of the condition and the need for timely correction. If appropriate, set a compliance deadline.
- Remove all Caltrans and consultant employees from the hazardous exposure.
- If the contractor does provide timely correction, consider ordering a suspension of the affected operation. Confirm the suspension order with written notice to the contractor.
- Document the incident in the project's safety report with appropriate references in the resident engineer's daily report.

2-103C Minor or Nonserious Conditions

Minor or nonserious conditions are ones that could result in minor injuries or that may be classified as a minor threat to health. When a nonserious or minor condition is found to exist, the resident engineer must take the following steps:

- Advise the contractor verbally of the condition and the need for correction.
- Document the incident in the project's safety report.
- Protect Caltrans and consultant employees from exposure.

If the contractor fails to correct the condition or permits a repeated occurrence, notify the construction safety coordinator.

2-104 Division of Occupational Safety and Health

2-104 Division of Occupational Safety and Health

This section provides information about the organization of Cal/OSHA, its enforcement powers, and Cal/OSHA inspections.

2-104A Authority and responsibility

The law requires Cal/OSHA to enforce the safety orders and to promote safe workplaces and practices. Cal/OSHA achieves this function through three separate agencies, a rule-making function, an enforcement function, and an independent appeals board, described as follows:

- The Occupational Safety and Health Standards Board (standards board) adopts, amends, and repeals the safety orders. Both state and federal law require that these safety orders be no less restrictive than the federal Occupational Safety and Health safety orders.
- Cal/OSHA is responsible for administering the safety orders as adopted by the standards board.
- Citations issued by Cal/OSHA for violations may be appealed to the Occupational Safety and Health Appeals Board for a hearing, and in rare instances, then appealed to a superior court.

To allow Cal/OSHA to accomplish its mission, the Labor Code gives Cal/OSHA the authority to enter and inspect any place of employment to ensure that safe conditions and practices are being observed. If necessary, this right of entry can be enforced by warrant.

2-104B Citations and Civil Penalties

Cal/OSHA has the duty to issue citations if unsafe conditions or work practices are documented during an inspection. Civil penalties are proposed consistent with the severity of the violations cited. The amount of the penalty is determined by procedures established in the regulations. Public agencies are not exempt from these penalties.

Violations are classified by severity, as either general or serious. Under specific circumstances, these classifications will be expanded to willful, repeat, or both. Violations result in monetary penalties. Penalties are also mandatory for failing to abate hazards and for making false statements.

In addition to the civil penalties noted above, managers can be held criminally responsible. To be held criminally responsible, the manager must knowingly or negligently allow a serious violation, repeatedly violate the safety orders, or directly refuse to correct a known, unsafe condition. The criminal penalties can be as severe as six months to one year in jail and may include fines.

Occasionally, Cal/OSHA will issue an informational memorandum when a condition, or potential condition, is encountered in which no employee has been exposed, but if an employee were to be exposed, a safety violation would exist. Violations of an informational memorandum are always classified as willful violations.

2-104C Classes of Employers

California recognizes four different types of employers, any of which can be cited by Cal/OSHA for safety violations. This classification of different types can result in more than one employer being cited for the same violation. The following are the recognized classes of employers as defined by the Labor Code:

- Exposing employer—The employer whose employees were exposed to the hazard.
- Creating employer—The employer who actually created the hazard.
- Controlling Employer—The employer who was responsible by contract or through actual practice for the safety and health conditions on the work site. This employer is the one who had the authority for ensuring the hazardous condition was corrected.
- Correcting Employer—The employer who had the responsibility for actually correcting the hazard.

With regard to Caltrans employees, Caltrans (not the resident engineer) may be the exposing employer if a Caltrans employee is allowed to work in an unsafe location or to participate in an unsafe act. Because Caltrans has given resident engineers and their staff engineers the authority to intervene when they believe a condition or act to be unsafe, the possibility also exists that Caltrans may be considered by Cal/OSHA to be a controlling employer.

2-104D Procedures During Division of Occupational Safety and Health Inspections

This section describes what takes place during a Cal/OSHA inspection and what resident engineers and their assistants should do during a Cal/OSHA inspection.

2-104D (1) Elements of a Cal/OSHA Inspection

Every Cal/OSHA inspection has three elements, the opening conference, the walk-through inspection, and the closing conference, described as follows:

- Opening conference—The Cal/OSHA inspector will ask for the highest level of management on-site. Introductions will be made, and the inspector will state the

reason and purpose of the inspection. At this time, the inspector will ask questions about the employer, such as the size of the organization, number of employees on-site, addresses and phone numbers, and other information. Questions may also be asked about the employer's injury and illness prevention program. The basis for Caltrans' program is the *Caltrans Safety Manual.* The employer will be asked for permission to make a walk-through inspection of the site, and the employer will be invited to accompany the inspector.

- Walk-through inspection—The inspector will tour the site observing the work in progress, the condition of the site, and the work practices being followed. Employees may be interviewed concerning the training they have received, work procedures, and protective equipment they are using. The inspector may take photographs and measurements during the inspection. If this is a post-accident investigation, witnesses will be identified and interviewed. Witness contact information, such as name, address and telephone number, may be requested. The inspector will identify any violations that are observed. Any such violation probably will become a citation during the closing conference.

- Closing conference—After the walk-through inspection has been completed, the inspector will meet with management, supervisors, and employee representatives to discuss the violations and any proposed citations. Citations may be based on the inspector's observations and also on statements made by managers, supervisors, and employees. This conference may be held immediately after the walk-through inspection or may be deferred. Although this conference is usually conducted in person, it may sometimes be conducted by telephone.

2-104D (2) Participation in the Inspection

- As a matter of policy, Caltrans will cooperate and participate with Cal/OSHA. If you are asked questions that you are uncomfortable with, politely decline to answer. Caltrans employees are not required to make any statement that may be harmful to their interests or those of Caltrans. In the event of an inspection, do the following:

- Opening conference—Notify the construction safety coordinator that Cal/OSHA is planning to make an inspection. If the construction safety coordinator is not available, notify the district safety officer of the pending inspection. At the same time, notify the construction engineer. If the construction safety coordinator or safety officer can arrive in a reasonable length of time, request that the walk-through inspection be delayed pending their arrival. The resident engineer or representative must participate in the inspection. The construction engineer should participate.

- Walk-through inspection—Participate and document the inspection. Record what areas were inspected, who was interviewed, and what violations were mentioned by the Cal/OSHA inspector. If the inspector takes photographs, take the same photograph for Caltrans records. Also, if any measurements are taken, independently take the same measurements.

- Closing conference—The resident engineer must participate in the closing conference, and the construction engineer or a representative (other than the resident engineer) should participate. If the district safety officer or construction safety coordinator is not present, insist that the closing conference be delayed until the district safety officer is present. If citations are proposed, remain open and noncommittal.

2-104D (3) Procedures If Citations Are Received

If citations are received either by personal delivery or by mail, take the following actions:

- Notify the district safety officer and your construction engineer that the citations have been served.
- Fax a copy of the citation to the Office of Safety and Health in the Administrative Service Center.
- For citations related to structure work, structure representatives must notify the Office of Structure Construction of the citations.

The district safety officer, and in most instances the Office of Safety and Health, will work with the resident engineer to resolve the citations. If necessary, arrangements for legal support will also be made.

2-105 Specific Safe Practices

Every employee has the responsibility to be informed of and to follow the specific policies and practices discussed in the *Caltrans Safety Manual.*

2-105A Code of Safe Practices

The Construction Safety Orders require that every employer adopt a written code of safe practices. The resident engineer must ensure that this code is prepared for every project. Pay particular attention to ensure the code includes those items unique to a specific project as well as those portions of the contractor's code that affect Caltrans employees and consultants. The project file must contain documentation that all employees and consultants have read and understood the code of safe practices and have received a project safety orientation.

2-105B Tailgate Safety Meetings

The Construction Safety Orders also require tailgate or toolbox safety meetings. As stated in Construction Safety Order 1509, "Injury and Illness Prevention Program," these meetings must be held at least once every 10 working days.

Section 2-05, "Tailgate Safety Meetings for Field Personnel," of the *Caltrans Safety Manual,* contains specific instructions for tailgate meetings. Follow this section and district policy.

2-106 Accident Reports and Investigations

Chapter 19, "Special Reporting of Serious Injury, Illness, or Fatality," of the *Caltrans Safety Manual,* explains the reporting requirements for the serious injury, illness, or fatality of Caltrans employees and non-Caltrans employees working on a Caltrans project. This chapter also explains the reporting requirements for major property damage or fatal accidents that occur in construction zones. Part 4, "The Investigative Processes," of Chapter 19, "Special Reporting of Serious Injury, Illness, or Fatality," of the *Caltrans Safety Manual,* discusses and describes accident committee investigations.

Report to the Division of Construction accidents with no injuries, but with a high potential for being fatal or disabling. These types of accidents include the following:

- Falsework or guying system failures
- Overturned cranes
- High-voltage contacts

- Trench excavation or shoring failures
- Gas or fuel line fires or explosions
- Hazardous utilities breaks
- Collisions with structures under construction or with their supporting falsework that cause displacement of a major member

For all accidents occurring in construction zones, the resident engineer should take sufficient photographs or videotapes to document the conditions that existed at the time of the accident, including all signing and traffic control features that may have been in effect at the time of the accident. Depending on district policy and the nature and severity of the accident, additional documentation may be required. For additional information on accident investigation and documentation, consult the construction safety coordinator.

2-107 Safety Precautions for the Public in Construction Areas

2-107 Safety Precautions for the Public in Construction Areas

Many construction activities and areas have a tendency to attract onlookers. Children, especially, are attracted to observe construction operations. Moving construction equipment poses a potential danger to onlookers.

Resident engineers and assistant resident engineers must be aware of these potential hazards to the general public and work with the contractor to take reasonable precautions to exclude the public from the construction area. Fencing, if practical, and "no trespassing" signs should be provided at all sites that may be potentially dangerous.

2-108 Hazardous Waste

2-108 Hazardous Waste

If hazardous waste is encountered on the project, notify the district hazardous waste coordinator immediately. The coordinator will advise and may assist in the disposal procedures and may also suggest extra safety measures the resident engineer can take to protect the public and workers.

See Chapter 7, "Environmental," of this manual for additional guidelines for dealing with hazardous waste.

Section 2 Traffic

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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 of Traffic Controls for Construction and Maintenance Work Zones (Manual of Traffic Controls)*.

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

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

2-205 Guidelines for Traffic Control Plans

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 of Traffic Controls* 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 *Traffic Manual*. 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

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

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 an 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 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 specify which specific construction operations must 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. Until COZEEP is available, prohibit the contractor from proceeding with any work identified in the special provisions as requiring COZEEP. If the contractor has made a timely request yet COZEEP service is 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*.

Use COZEEP for extra work in conformance with these guidelines.

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

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 have included an estimated number of COZEEP service hours that were then converted into a 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 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 the detail at his or her regular duty station and must include travel to and from the project.

The district COZEEP coordinator will provide current hourly costs for the project location. The current hourly costs must include a mileage allowance.

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 six 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. Once contact is made, the CHP coordinator will return the task order with Part 7 completed.

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 Part 7 of the task order if Caltrans is being charged with a cancellation fee or a 4-hour overtime fee. If the cancellation notice 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 notice 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 3 Major Construction Incidents

2-301 General

2-302 Reporting Procedures

2-302A Accidents To Be Reported
2-302B Unusual or Extraordinary Construction Occurrences To Be Reported
2-302C Highway Closure Notification

2-303 Guidelines

Section 3 Major Construction Incidents

Section 3 Major Construction Incidents

2-301 General

2-301 General

This section provides guidelines for reporting and dealing with accidents and major incidents on construction projects. For detailed guidelines on reporting, see Chapter 19, "Special Reporting of Serious Injury, Illness, or Fatality," of the *Caltrans Safety Manual*. This chapter also discusses special reporting for a serious occupational injury, illness, or fatality connected with any employment activity.

2-302 Reporting Procedures

2-302 Reporting Procedures

Immediately report all reportable accidents and major incidents to the district dispatch center, or when this center is closed, to the headquarters Highway Information Center. Use Form CEM-0603, "Major Construction Incident Notification," to fax an initial report to the Office of Safety and Health in the Division of Administrative Services, the Division of Construction, and the district construction safety coordinator. Follow the instructions on the back of the form. When necessary, also use Form CEM-0603 to fax an updated report providing supplementary information. The following are descriptions of reportable accidents and construction incidents:

2-302A Accidents To Be Reported

Report the following types of accidents:

- Accidents resulting in serious injury to a contractor's employee.
- Accidents involving death or serious injury to a state or a consultant employee or resulting in the death of a contractor's employee.
- Accidents involving serious damage to equipment owned by Caltrans, by a consultant, or by the contractor.
- Accidents resulting in the serious injury or death of a member of the public within the construction zone, or influenced in any manner by construction related activities, conditions, equipment, or personnel.
- All catastrophic types of accidents or accidents receiving wide media coverage.
- Accidents with no injuries, but with a high potential for being fatal or disabling. These accidents include falsework or guying system failures, overturned cranes, high-voltage power line contacts, trench excavation or shoring failures, gas or fuel line fire or explosions, hazardous utility breaks, and collisions with structures under construction or their supporting falsework that cause displacement of a major member.

2-302B Unusual or Extraordinary Construction Occurrences To Be Reported

Unusual or extraordinary construction occurrences are reportable incidents that may not be classified as accidents. Examples of these incidents include the following:

- Disasters that result in major damage to a state facility or project work.
- Situations that result in the evacuation of the project, the immediate area, or both.
- Any other events that affect the state facility or project work and may generate media coverage.
- Encounters of previously unknown hazardous waste on a construction project.
- A hazardous spill on a roadway within construction project limits.
- Any incident causing major traffic delays.

2-302C Highway Closure Notification

Report to the district dispatch center or the traffic management center any situation that requires unplanned closures of traffic lanes or the highway.

In advance, report routine planned lane closures to the district dispatch center or the traffic management center as required by district policy.

If the contractor cannot remove a lane closure by the specified pickup time, notify the district dispatch center or the traffic management center as soon as possible. Provide accurate information to allow the traffic management center to notify the California Highway Patrol, the media, and the public of possible delays.

2-303 Guidelines

2-303 Guidelines

Caltrans construction personnel responding to major incidents in construction zones must do the following:

- Take appropriate action without jeopardizing public or employee safety.
- Provide timely and accurate information to management to document the extent of the incident and identify major issues and current actions.
- Restore the transportation facility to full operation as quickly as possible in the event of a closure or restriction.
- Minimize or mitigate the effect on the public or the project caused by unusual or extraordinary occurrences.

Report hazardous waste encounters and hazardous spills as outlined under "Reporting Procedures" earlier in this section. For more information on the procedures to follow in the event of hazardous waste encounters or hazardous spills, see Section 7-106, "Environmental Hazards and Safety Procedures," of the *Construction Manual* (manual).

The contractor must have a contingency plan for reopening closed traffic lanes. See Section 3-704B, "Contingency Plans for Reopening Lane Closures," of this manual.

The district construction deputy director must activate a construction incident response team when warranted by the sensitivity and severity of a major incident. The team's principal purpose is to provide information to Caltrans managers and the media. The team enables the resident engineer to focus on restoring the transportation system, the project, or both. The team may also advise the resident engineer on technical matters. The construction engineer heads the team, which may also include the following personnel:

- A representative of the district public relations staff, depending on the media interest.
- Technical personnel from other functional areas such as safety, traffic, structures, design, or environmental, as required by the situation.

Introduction

Introduction

3-001 Scope

3-001 Scope

Each section in this chapter of the *Construction Manual* corresponds to one of the first nine "General Provisions" sections of the *Standard Specifications*. This chapter contains guidelines and procedures for administering these sections of the *Standard Specifications*. The chapter also includes guidelines and procedures for topics within the scope of the *Standard Specification* sections, but not specifically covered by them.

3-002 Purpose

3-002 Purpose

The purpose of this chapter is to ensure that the "General Provisions" sections of the *Standard Specifications* are enforced and administered uniformly for all Caltrans contracts by providing and establishing guidelines and procedures for administering contracts.

As with the entire manual, this chapter is not part of the contract and places no burden or obligation on the contractor. Also, this chapter is not a substitute for reading and understanding the General Provisions. It is, however, necessary reading for resident engineers and others who assist and support resident engineers in contract administration. This chapter answers many frequently asked questions about the procedures for administering contracts.

Section 1 Definitions and Terms

Section 1 Definitions and Terms

Section 1, "Definitions and Terms," of the *Standard Specifications*, defines terms, abbreviations, and symbols used for units of measurement in the *Standard Specifications*. Section 1 also defines symbols used for units of measurement in the engineer's estimate. The *Standard Plans* also contain a list of abbreviations and symbols.

Resident engineers and others preparing contract documents and correspondence must be familiar with the terms and symbols and use them correctly.

Section 2 Proposal Requirements and Conditions

3-201 General

3-202 Advertisement

3-203 Bid Opening

3-204 Communication With Bidders

3-205 Disclosure of Construction Estimates

3-206 Names of Prospective Bidders

Section 2 Proposal Requirements and Conditions

Section 2 Proposal Requirements and Conditions

3-201 General

3-201 General

Section 2, "Proposal Requirements and Conditions," of the *Standard Specifications* covers proposal requirements and conditions that apply to a contractor bidding on a project. The Office of Office Engineer must adhere to this section's requirements. District construction personnel must be familiar with this section, including the contractor's responsibilities and options after bids have been opened.

3-202 Advertisement

3-202 Advertisement

Before the plans and specifications are made available to the public, California law requires the publication of contract information in the *State Contracts Register*. Before bid opening, Caltrans will then allow a minimum of three weeks (more if the project is complex) for contractors to purchase plans and specifications and prepare their bids. Emergency projects may have a shortened advertisement period.

3-203 Bid Opening

3-203 Bid Opening

For projects in northern California (districts 1, 2, 3, 4, 5, 6, 9 and 10), bids open in Sacramento on Tuesdays and Wednesdays. For projects in southern California (districts 7, 8, 11 and 12), bids open on Thursdays in the District 12 headquarters in Irvine.

The Division of Administrative Services administers the bid projects estimated to be below $117,000, which are designated as minor B. For minor B projects in northern California bids are opened in Sacramento while minor B projects in southern California bids are opened in Irvine.

3-204 Communication With Bidders

3-204 Communication With Bidders

To protect the integrity of the bidding process, no bidder must be given a real or perceived advantage over any other bidder. Use the following guidelines to ensure that any information provided to one bidder is also provided to all other potential bidders for a particular project.

- Only the designated district construction personnel must answer bidder inquiries. The design engineer, construction field personnel, or other nondesignated Caltrans personnel must never respond directly to bidder inquiries.
- Thoroughly investigate bidder inquiries, and provide timely and conclusive responses.
- Distribute or post written responses to all plan holders via fax, the Internet, or other similar means.
- Number the responses to facilitate bidder comments and follow-up questions to responses. Specify the date responses are posted.

- Include the following language with all responses published or posted:

> Responses to bidder inquiries, unless incorporated into formal addenda to the contract, are not a part of the contract, and are provided for the bidder's convenience only. In some instances, the question and answer may represent a summary of the matters discussed rather than a word-for-word recitation. The availability or use of information provided in the responses to bidder inquiries is not to be construed in any way as a waiver of the provisions of Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the *Standard Specifications* or any other provision of the contract, the plans, *Standard Specifications*, or special provisions, nor to excuse the contractor from full compliance with those contract requirements. Bidders are cautioned that subsequent responses or contract addenda may affect or vary a response previously given.

- Refer directly to the plans, specifications, and other provisions of the contract. Quote specific sections of the *Standard Specifications* and special provisions, as well as specific sheet numbers and details on the plans and *Standard Plans*.

- Ensure conclusive responses. If an inquiry cannot be answered conclusively by directly referring to the contract provisions and requires some measure of amplification, confirm the statewide interpretation by consulting with the district construction office, the Division of Construction, the Division of Engineering Services, or other program with the necessary knowledge. In such cases, give special emphasis to assessing the need for an addendum. Before giving a response that involves inquiries regarding construction methods, obtain direction from the district construction office. Routinely route inquiries and proposed responses through appropriate support and construction functions. Before bid opening, route all inquiries and responses to the resident or construction engineer responsible for administering the project.

- If an inquiry indicates the contract should be modified, issue an addendum. Before publicly posting any referrals to the addendum, issue it. When an addendum is issued in response to an inquiry, post "Per Addendum No.--, dated —" as the inquiry response. The district office engineer must notify the Office of Office Engineer as soon as possible of addenda proposed or under consideration. Responses to inquiries, whether made verbally or in writing, do not become part of nor change the contract. However, they may be used in defending Caltrans or the contractor's position in a dispute when the industry has been given related knowledge before bidding.

- Rarely respond with "Bid it as you see it." However, such responses may be appropriate, depending on the scope of the particular issue, the timing of the bidder inquiry, and other factors.

- It may be impractical to post responses to certain inquiries that are submitted too close to the bid opening date. Although you should aggressively pursue the investigation of all bidder inquiries, Caltrans may, considering the particular circumstances, waive posting a response, if warranted.

- Post all responses, including "Bid it as you see it" responses.

- Consider written bidder inquiries only when a completed "Bidder Inquiry" form is submitted when the contract requires this form.

- Even if the contract does not require written bidder inquirers, Caltrans strongly encourages the form's use to the extent practical because the form helps manage bidder inquiries and responses. You can obtain a sample of this form from the Office of Office Engineer.

3-205 Disclosure of Construction Estimates

3-205 Disclosure of Construction Estimates

Until bids are opened, Caltrans' estimate of the cost of contract items for any particular project is not public information. Also, at any time before or after bids open, unit prices and details of any portion of the project estimate are not public information.

Before bid opening, the public can only know the total funds available, an amount that the weekly advertisement for bid listing provides either in hardcopy form or on the Internet at the following address:

http://www.dot.ca.gov/hq/esc/

You can obtain minor B project information by calling the Sacramento office at (916) 227-1950 or from the Internet at the following address:

http://www.ns.net/caltrans/purchase.htm

3-206 Names of Prospective Bidders

3-206 Names of Prospective Bidders

For all projects, except minor B construction project, the names of prospective bidders can be obtained by requesting in writing or by fax a "Plan Holders List" from the Caltrans' plans counter in Sacramento, Fax (916) 654-7028, or from the internet at the following address:

http://www.dot.ca.gov/hq/esc/

Section 3 Award and Execution of Contract

Section 3 Award and Execution of Contract

3-301 General

3-301 General

Section 3, "Award and Execution of Contract," of the *Standard Specifications* outlines the requirements for award and execution of the contract.

The Office of Office Engineer (Awards Unit) prepares and processes the documents necessary to award or reject a project. Districts recommend award of the contract or rejection of bids.

Construction is responsible for administration of the contract and generally assumes this responsibility at the time of award. Administrative details are covered under Section 3-802A, "Work Before Contract Approval," of the *Construction Manual* (manual.)

3-302 District Recommendation

3-302 District Recommendation

The district recommendation procedure is described in detail including questions to ask contractors in Section 1-2.08, "Bid Opening and Award," of the *Plans, Specifications and Estimates Guide*.

The district must not reveal the award recommendation to any contractor or external agency or entity until the final award decision is made by the Engineering Services, Office of Office Engineer. The Office of Office Engineer will inform the contractor of Caltrans' decision.

Section 4 Scope of Work

3-401 Intent of Plans and Specifications

3-402 Final Cleaning Up

3-403 Changes

3-403A Procedure and Protest
3-403B Increased or Decreased Quantities
3-403B (1) Increases of More Than 25 Percent
3-403B (2) Decreases of More Than 25 Percent
3-403B (3) Eliminated Items
3-403B (4) Surplus and Salvaged Material
3-403C Changes in Character of Work
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3-404 Construction-Evaluated Research

3-405 Detours

3-405A Use of Local Streets and Roads

3-406 Use of the Material Found in the Work

Section 4 Scope of Work

Section 4
Scope of Work

3-401 Intent of Plans and Specifications

3-401
Intent of Plans and Specifications

The contractor must construct the project in accordance with the plans and specifications, including changes ordered in accordance with the contract. Both the contractor and the resident engineer must be familiar with the work to be done and the commonly accepted practices, customs, and terms used in the work.

Use judgement when dealing with problems arising from ambiguity or apparent conflict in the plans and specifications. Review the work from the contractor's viewpoint, as well as the engineer's. The resident engineer's interpretation should be one that a reasonable contractor, exercising prudence and caution, would obtain from the contract documents. Guard against decisions based on a reasonable doubt. Also, avoid searching out and using pure technicalities or making unreasonable inferences.

3-402 Final Cleaning Up

3-402
Final Cleaning Up

Section 4-1.02, "Final Cleaning Up," of the *Standard Specifications* requires the contractor to clean up the work site. In addition to this general requirement, Section 22, "Finishing Roadway," of the *Standard Specifications*, contains more detailed requirements for cleaning the roadway. For more information, see Section 4-22, "Finishing Roadway," of the *Construction Manual* (manual).

Before recommending relief of maintenance or acceptance of the contract, ensure the contractor meets all the requirements for cleaning up the site. Section 4-1.02 permits certain construction signs to be left in place until after contract acceptance. However, before contract acceptance, require the contractor to remove all construction signs except those necessary to cover work performed on the last day of the contract.

3-403 Changes

3-403
Changes

Based on the State Contract Act, Caltrans policy is to limit changes to those required to complete the work as contemplated at the time the plans and specifications were approved. If proposed changes do not conform to this policy, the work must be performed by a separate contract unless compelling reasons exist that justify the changes in the current contract. If added work, which conforms to the policy, is not required immediately, consider performing the work by a separate contract.

Adequately analyze all proposed changes for environmental considerations, for obligations or commitments to other agencies, and for effects on the orderly completion of the entire contract. When a project nears completion, evaluate carefully the effects of changes on the contract's time of completion. Changes ordered near the contract's completion could disrupt the contractor's schedule and costs. They could also substantially delay the public's use of the facility and disrupt the planned use of Caltrans forces.

When you determine that a change must be made, include the additional work by a contract change order. Discuss with the contractor all elements of a change, including the method of compensation and the effect on contract time. Your objective during the discussion is to develop full agreement or to identify elements that require negotiation or that could lead to protest. Your objective is also to ensure the contractor accurately understands all the elements of the change.

3-403A Procedure and Protest

The contractor may protest the terms or conditions of an approved contract change order. The protest must be made in accordance with the requirements in Section 4-1.03A, "Procedure and Protest," of the *Standard Specifications*. The protest must be concerned solely with compensation or time. Moreover, no basis exists for protesting the requirement to perform the added or revised work because the specifications require the contractor to perform ordered work.

The specifications allow the resident engineer to order work before the approval of a contract change order providing for that work. However, an approved contract change order should be issued as soon as possible. If the contractor does protest the contract change order, the sooner the protest is made, the sooner the issue can be addressed and resolved.

3-403B Increased or Decreased Quantities

When the total pay quantity of a contract item varies from the engineer's estimate by more than 25 percent, the variation may be the result of more or fewer units than shown in the engineer's estimate required to complete the planned work. The variance may also result from ordered changes or a combination of both of these factors. When the variation does exceed 25 percent, adjust the compensation in accordance with Section 4-1.03B, "Increased or Decreased Quantities," of the *Standard Specifications* or document in the contract records the reason for not making an adjustment in compensation. When the accumulated increase or decrease in contract item units shown on a contract change order exceeds 25 percent of the engineer's estimate, the overrun or underrun must be acknowledged and provided for in the current contract change order. You can provide for this overrun or underrun through one of the following options, whichever is applicable:

- Adjust the contract price in accordance with Section 4-1.03B.
- Defer any adjustment in compensation due to the overrun or underrun.
- State in writing that the contract item is not subject to adjustment.See Section 5-3, "Contract Change Orders," of this manual for a discussion and examples of contract change orders providing for adjustments in compensation resulting from increased or decreased quantities.

3-403B (1) Increases of More Than 25 Percent

It is usually appropriate to defer adjustment if work on the contract item has not been completed. Additional contract change orders may be affecting the quantity, or the number of units required to complete planned work may not be known. However, as soon as unit costs and final quantities can be reasonably determined, calculate any required unit adjustment and provide for it through a contract change order. When work on the contract item is completed, you may apply the unit adjustment to the total number of units in excess of 125 percent of the engineer's estimate.

Unless requested by the contractor in writing, the engineer does not have to adjust the contract price of an item if the contract item cost of the work in excess of 125 percent of the engineer's estimate is less that $5000. However, before exercising

this right, ensure Caltrans will not gain any economic benefit from an adjustment. On the other hand, make an adjustment if it would decrease cost and the amount of the decrease would exceed the cost of making the adjustment.

3-403B (2) Decreases of More Than 25 Percent

If a contract item underruns the engineer's estimate by more than 25 percent, inform the contractor in writing as soon as work on the item has been completed. Unless the contractor requests an underrun adjustment in writing, no adjustment will be made.

3-403B (3) Eliminated Items

Section 4-1.03B(3), "Eliminated Items," of the *Standard Specifications* applies only to contract items eliminated in their entirety. Advise the contractor as soon as it is known that an item will be eliminated. Caltrans will not be responsible for costs incurred for material ordered after notification.

In the contract change order providing for the elimination of a contract item, ensure you cover the disposition of surplus material. Refer to the information below, titled "Surplus and Salvaged Material," for how to handle surplus material resulting from an eliminated item that cannot be returned to the vendor.

3-403B (4) Surplus and Salvaged Material

Minor differences between quantities of material required to complete the planned work and quantities shown in the engineer's estimate or shown in quantity summaries on the contract plans are normal operating differences. Caltrans is not liable for a surplus of material resulting from these operating differences.

If the final quantity of an item is less than 75 percent of the engineer's estimate, include any actual loss due to excess material in the costs as computed in accordance with section 4-1.03B(2), "Decreases of More Than 25 Percent," of the *Standard Specifications*. Do not make any allowance for material the contractor keeps.

Caltrans recognizes that certain materials or manufactured items required for the planned construction may be unique and not useable by the contractor, the supplier, or for other projects or customers. If such materials or items become surplus by reason of an ordered change, resulting in a direct and unavoidable loss to the contractor, such loss must be compensated. Determine compensation on the basis of actual cost as provided in Section 4-1.03B(3), "Eliminated Items," of the *Standard Specifications*. The guidelines below describe how to dispose of material that the contractor cannot economically dispose of.

Base a determination to salvage items made surplus by ordered changes on economic benefit to Caltrans, conservation of the energy and materials required to fabricate the items, or both. Base economic benefit on the following:

- The item's condition is adequate to perform its function satisfactorily. Damage does not necessarily make an item unsuitable for salvage. Caltrans has the capability to repair some items, so investigate this approach before deciding to dispose of a damaged item. Also consider repair costs when determining the cost-effectiveness of salvaging.
- The value equals or exceeds the difference in the cost of salvaging (including hauling) and the cost of removal and disposal.

Additionally, an item should be salvaged if it meets one or more of the following conditions:

- It is a stock item with a definite, foreseeable use. Stock items include all items that Caltrans normally uses.
- It is not a stock item, but can be put to immediate use or has a definite, foreseeable use. This classification would include items that can be reinstalled in the immediate project or could be installed on future projects.
- It is part of an electrical installation owned jointly with another agency, and the other agency requests its salvage.
- It can be used immediately for some other beneficial purpose.

Most districts maintain a district salvage yard or other designated areas for receiving salvaged material. Each district also has a district recycle coordinator. Before the delivery of potentially salvageable items, make arrangements with the appropriate person. Materials should not be salvaged until such arrangements are made.

3-403C Changes in Character of Work

Before work can be considered "changed in character," the engineer must have ordered a change to the plans or specifications. If such an ordered change materially increases or decreases the unit cost of a contract item, then a change in character has occurred. Changes in character of work are not to be confused with "differing site conditions." For a discussion of differing site conditions, see Section 3-5, "Control of Work," of this manual.

When calculating the adjustment for a change in character of work, the original bid price bears no relation to the adjustment unless it can be demonstrated that the bid price actually represents the cost of the work. Section 5-3, "Contract Change Orders," of this manual contains examples of calculations and sample contract change orders.

3-403D Extra Work

Extra work is any new and unforeseen work that cannot be covered by a contract item or a combination of contract items, or it may be work designated as extra work in the specifications. Extra work is not a payment method. See Section 3-9, "Measurement and Payment," and Section 5-3 of this manual for a discussion of payment methods for extra work.

All new and unforeseen work is not necessarily extra work. Caltrans policy requires you to use as a guide the specifications' definitions of the various contract items. If the added work involved in an ordered change can be defined as the same as items included in the contract, payment must be at the contract item price.

If the added work in the change can be defined as contract items, but a change exists in the unit cost, make payment under the provisions of Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications*," rather than for the entire added work as extra work.

New and unforeseen work, whether paid for under an item or classified as extra work, becomes a part of the contract when added by an approved contract change order. The contractor bears the same responsibility for this added work as for any other work under the contract.

3-404 Construction-Evaluated Research

3-404 Construction-Evaluated Research

One of Caltrans' goals is to continue to improve the effectiveness of our products, information, and services. The Division of Construction participation is important in demonstrating the effectiveness of new products and services.

Construction contracts that include evaluations of new products require the resident engineer to participate in the new product evaluation. The form and evaluation criteria should be included in the resident engineer's pending file. If the evaluation information is not in the file, the resident engineer should contact the new products coordinator in the Office of Materials Engineering and Testing Services (METS).

To add and evaluate a new product for an ongoing construction contract requires a contract change order. To approve the contract change order, the following is required:

- Confirmation from the new products coordinator of METS that the assessment is necessary and the evaluation criteria are readily available.
- Determination from the resident engineer that the addition of the new product is incidental to the work.
- Concurrence from the Division of Construction new products coordinator.

Forward the evaluation report for all construction-evaluated research to the new products coordinator of METS within 30 days of completing the evaluation of the new product.

3-405 Detours

3-405 Detours

The contract plans may include detour plans required for traffic passing through the project. Pay for the construction of these planned detours, temporary signing, and other traffic control devices at contract item prices. The cost of repairing damage to detours caused by public traffic will be paid for as extra work.

If it is necessary to construct detours that are not provided for in the project plans and specifications, contract change orders must provide for these detours. For design details, you may consult with the district design unit if necessary. In all cases, the district traffic unit must concur with detour design and signing provided for by contract change order.

3-405A Use of Local Streets and Roads

Use of local streets and roads to detour state highway traffic requires agreements or other arrangements to be made with the local agency. When the use of local roads for detours is included in the project plans, the district design unit will have made these arrangements. When contract changes require the use of local streets and roads, contact the project manager for assistance in making the proper arrangements with the local agency.

3-406 Use of the Materials Found on the Work

The engineer's designation of selected material takes precedence over the contractor's request for the use of materials found on the work.

The specifications provide that the engineer's approval is necessary for the contractor to use materials from within the planned slopes and grade lines, and written authorization is required for the use of materials outside the planned slope and grade lines. "Approval for the use of materials found on the work" shall be given in writing from the resident engineer, but "written authorization to use materials outside of planned lines and grades" must be by contract change order.

The authorization for excavation outside the planned slopes and grade must be justified as a benefit to the Caltrans. Under no circumstances should such work be authorized if it in any way adversely affects the appearance or function of the planned project.

Section 5 Control of Work

3-501 General

3-502 Authority of Engineer
3-502A Resident Engineer

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Section 5 Control of Work

Section 5 Control of WorkWork

3-501 General

3-501 General

Section 5, "Control of Work," of the *Standard Specifications*, details how contract work will be controlled. The proper performance of the contractor and the engineer ensure control. During the manufacture of products and the execution of the project, the contractor performs all actions necessary to ensure the work has the required attributes. The engineer samples, tests, and inspects the work to determine if the characteristics conform to the contract requirements.

3-502 Authority of Engineer

3-502 Authority of Engineer

The term "engineer," as used in Section 5-1.01, "Authority of Engineer," of the *Standard Specifications*, means the "chief engineer" acting through authorized representatives. The authorized representatives must act in accordance with the chief engineer's policies and procedures, and in the absence of written instruction, the representatives must exercise judgement within their span of control and ability. Section 1-1.18, "Engineer," of the *Standard Specifications* defines the term "engineer."

The engineer will focus on the details and methods of performing the work only if one or more of the following conditions exist:

- If the details and methods of performing the work are specified
- If the essential attribute or end result cannot be measured
- If public safety or convenience is involved

Otherwise, the details and methods must be left to the contractor's discretion.

3-502A Resident Engineer

The resident engineer (subject to delegation of authority within the district) is the authorized representative of the chief engineer on the project; therefore, contacts and correspondence should be between the contractor and the resident engineer.

Resident engineers must report their assignments to all interested parties by submitting Form CEM-0101, "Resident Engineer's Report of Assignment." Submit this form at the earliest possible time.

Good working relationships between the resident engineer and the contractor do much to encourage an effective, efficient project and can minimize misunderstandings and disputes.

3-503 Plans and Working Drawings

3-503 Plans and Working Drawings

The contract may require that plans and working drawings be submitted to the engineer for approval. Caltrans has established a formal procedure for the approval of such plans for those facilities designed by the Office of Structure Design. For the procedures for buildings, see Section 132 of the *Bridge Construction Records and*

Procedures Manual, Volume II. These procedures should be reviewed when applicable to resident engineers. Similar procedures are used for pumping plants and electrical and mechanical equipment. The district must establish similar procedures for those facilities designed in the district.

In addition, the contract may require plans and calculations be submitted to the resident engineer for review and approval for falsework, shoring, and bridge demolition. For guidelines for the review and approval process see sections 120, 122, and 124, respectively, of the *Bridge Construction Records and Procedures Manual*, Volume II.

3-503A Trench Excavation Safety Plans

For each location, the contractor must submit a specific plan describing how workers will be protected from the hazards of ground caving in.

Simply stating that the *Construction Safety Orders* will be followed does not constitute a plan.

3-504 Order of Work

3-504 Order of Work

If the plans or special provisions do not contain a specified sequence of operations, contractors may select their own schedules, provided the planned order of work meets any dates specified for completion and openings of portions of the work to traffic.

Occasionally, the contractor may submit a proposed modification of the specified order of work that will be more satisfactory for the work's operation. If, in the resident engineer's opinion, Caltrans will benefit as much or more by adopting this proposal as it would under the specified plan, the contractor's plan may be implemented with a contract change order requested by the contractor. Caltrans must receive a monetary adjustment if the contractor has any reduced costs from the change. Also, a contractor may benefit if a change is proposed and accepted under a change order for a cost reduction incentive. See Section 3-514, "Cost Reduction Incentive," of the *Construction Manual* (manual) and Section 5-1.14, "Cost Reduction Incentive," of the *Standard Specifications*.

The resident engineer must recheck the specified plan of operations during the work's progress. Changes in circumstances may necessitate altering the planned sequence and schedule. Stage construction is often a part of the contract on major projects, and revised progress schedules may be required as the stages of work develop.

3-505 Superintendence

3-505 Superintendence

As required by Section 5-1.06, "Superintendence," of the *Standard Specifications*, contractors, including those in a joint venture, must name, in writing, one authorized representative. Resident engineers must insist contractors meet this requirement promptly. In case of disagreement among the contractors' representatives, the resident engineer can then contractually refuse to deal with more than one representative.

3-506 Lines and Grades

3-506
Lines and Grades

Section 5-1.07, "Lines and Grades," of the *Standard Specifications* requires the engineer to establish any lines and grades necessary to permit satisfactory completion of the specified work. For information on construction surveys, see Chapter 12, "Construction Surveys," of the *Caltrans Surveys Manual*.

To establish line and grade, the district surveys unit must set the construction marks and stakes.

3-507 Inspection

3-507
Inspection

The resident engineer and assistant resident engineers have a primary duty to obtain compliance with the *Standard Specifications*, special provisions, and plans within the tolerances specified in these documents. When tolerances are not specified, the engineer must use judgment in determining the allowable deviation consistent with the usage of the trades involved.

Section 5-1.08, "Inspection," of the *Standard Specifications*, allows the engineer access to the work for the purpose of an inspection. The engineer must take full advantage of this access. Rarely can an engineer adequately inspect work from the seat of a car or pickup truck.

3-508 Removal of Rejected and Unauthorized Work

3-508
Removal of Rejected and Unauthorized Work

Section 5-1.09, "Removal of Rejected and Unauthorized Work," of the *Standard Specifications*, specifies the contractor's responsibility for rejected or unauthorized work.

Unauthorized work includes excavation outside planned slopes and below the grading plane. Unless an approved contract change order authorizes such excavation, do not permit it.

Section 3-603, "Defective Materials," in this manual, discusses the rejection of material that fails to meet specified requirements. Rejected material must be removed and replaced. When rejected material is remedied, it may remain in place only when the engineer gives written approval. In most cases, this approval requires a contractor requested contract change order. For instance, a contract change order would be necessary to approve a contractor's proposal to remedy out-of-specification aggregate base by adding additional aggregate to material deposited previously. A contract change order in this situation is necessary because the remedy requires a change in specifications. However, the engineer's written approval is not required when the remedy is specified, such as the remedy for damaged galvanizing of pipe or guardrail.

For all material used in the work, make the payment in accordance with the specifications. As an alternative to removal and replacement, do not allow defective material to remain in place without contract payment. Any such action must be provided for in the specifications under "operating range" and "contract compliance" or provided by an approved contract change order.

3-509 Equipment and Plants

3-509
Equipment and Plants

Section 5-1.10, "Equipment and Plants," of the *Standard Specifications*, requires each piece of equipment to have a number stamped or stenciled upon it. The identifying number should further be referenced to the license plate issued for the piece of equipment. This additional reference is especially important in the case of tractor and trailer combinations where the tractor may pull different trailers on separate occasions.

The engineer must use the identifying numbers to keep records of working and idle time for both the equipment and operators, including, among other items, contract items, extra work, move in and out, and plant erecting. Some items of work will require more complete records than other items. The resident engineer must determine which items of work need these records and how much detail will be necessary. Records of this kind are also required for costs when the quantity of certain contract items runs over 125 percent or under 75 percent of the estimated quantity.

Caltrans personnel must not instruct the contractor's employees in equipment operation. The resident engineer must be very careful in this area because the contractor may interpret suggestions as the engineer's direct orders. Caltrans personnel must also not adjust the contractor's equipment or ride on equipment other than that designed for personnel transportation or as required to inspect specific features of the work.

3-510 Alternative Equipment

3-510 Alternative Equipment

In lieu of specified equipment, Section 5-1.11, "Alternative Equipment," of the *Standard Specifications,* provides for the use of new or improved equipment subject to satisfactory performance as determined by the engineer.

Contract change orders must cover all modifications under Section 5-1.11. Do not adjust cost for such changes.

3-511 Differing Site Conditions

3-511 Differing Site Conditions

When a differing site condition occurs, Section 5-1.116, "Differing Site Conditions," of the *Standard Specifications,* provides recourse for Caltrans and the contractor. When a differing site condition arises, the resident engineer or structure representative should consult with the district materials unit or the Office of Materials Engineering and Testing Services. The following presents the two types of differing site conditions that exist, followed by the procedure to recover damages or savings for a differing site condition claim:

<u>3-511A Type 1</u>
Type 1 consists of actual subsurface or latent physical conditions materially different from those indicated in any of the following:

- The contract
- The log of test borings
- Other records of geotechnical data obtained by Caltrans' investigation of subsurface conditions
- The "materials information"
- Other records of data to the extent they were available to the contractor prior to the opening of the bids
- Or an examination of site conditions above ground

<u>3-511B Type 2</u>
Type 2 consists of unknown physical conditions of an unusual nature that are materially different from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract.

3-511C Procedure

For the contractor to recover damages for a differing site condition claim, the following things must be done:

- Before the bid, the contractor must investigate the site and carefully examine the following items:
  1. Plans
  2. Specifications
  3. "Materials information"
  4. Log of test borings
  5. Other records of geotechnical data (cores and other physical data) obtained by Caltrans' investigation of subsurface conditions
  6. Other records of data to the extent they were available to the contractor.

This investigation is required by Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the *Standard Specifications*.

- The conditions encountered must either be materially different from those represented by the bid documents, other records of data available to the contractors prior to bid, and a site investigation, or be materially different from those normally encountered or inherent in the industry.
- Before disturbing the conditions, the contractor must provide to the resident engineer written notice of them.
- The resident engineer must then investigate the conditions and determine if they differ materially and cause an increase or decrease in the cost or time to do the work.

The resident engineer must remain alert to the possibility that a differing site condition may result in a credit to the state. If such a condition is encountered, the resident engineer must promptly notify the contractor in writing.

The specifications for differing site conditions do not apply to those situations covered in the *Standard Specifications* under Section 8-1.09, "Right of Way Delay", Section 8-1.10, "Utilities and Non-Highway Facilities", or Section 19-1.04, "Removal and Disposal of Man-Made Objects."

Differing site conditions are not considered "changes in character" because the conditions do not result from ordered changes. However, determine and give compensation or credit due to differing site conditions in the same manner as you would for changes in character. For how compensation is made for changes in character and for a sample contract change order, see Section 5-3, "Contract Change Orders," of this manual.

3-512 Character Of Workers

3-512 Character Of Workers

Section 5-1.12, "Character of Workers," of the *Standard Specifications*, covers the issue of character of workers. In addition, Caltrans policy calls for a work environment with zero tolerance for violence, threats, harassment, and intimidation. This policy also applies to the employees of a contractor in their dealings with Caltrans personnel. Caltrans may discharge a contractor's employee from the project for engaging in any of the above mentioned activities.

3-513 Final Inspection

As a project's completion approaches, the resident engineer must schedule appropriate reviews with maintenance, traffic, and safety personnel.

To resolve any potential problems on interstate projects, request a field engineer from the Federal Highway Administration to review the project before the day of final inspection. Your objective is to prevent last-minute delays in contract acceptance.

According to Section 5-1.13, "Final Inspection," of the *Standard Specifications*, the engineer must do a final observation of the contract work during the final inspection. The district director or an engineer from the district construction, such as the district construction deputy director, construction engineer, structure construction engineer, or resident engineer, must make the final inspection.

Maintain a record of the final inspection in the resident engineer's daily report. The record should state something along the following lines:

> "I made a final inspection of the project today and determined that all contract work has been completed."
>
> *Or,*
>
> "(Name) made the final inspection today and concurred that all contract work has been completed."

Time the final inspection so that the recommendation for contract acceptance will not be delayed pending the inspection. Before the final inspection, give the contractor a written list of items needing attention.

3-513A Work for Other Agencies or Owners

When any work performed under the contract is for other agencies or owners, as a courtesy ask for the concurrence of these entities in the acceptability of the work. Include the concurrence of others such as local agencies, other state agencies, utility companies, and school districts.

Also ask for concurrence from another party or agency if it finances a state highway project or a portion of the project. The district must arrange a joint field inspection with the owner or agency. In writing and in advance (usually 30 days), notify the owner or agency when the facility will be ready for final inspection. Time the inspection so that concurrence for acceptance is available at the time of recommending to the director the acceptance of the contract or relief from responsibility for maintenance. However, do not withhold recommendations for acceptance or relief merely because an outside agency will not concur.

The letter notifying the owner or agency of readiness for inspection should include the following:

- A reference to the agreement.
- A statement that the inspection is to determine whether work is in compliance with plans, the agreement, or both.
- The date of the inspection.
- A request that when an inspection reveals no deficiencies, the agency's authorized representative responsible for performing the inspection will confirm in writing that the agency agrees to accept the work.

- A statement that failure by the agency to inspect or confirm acceptance in writing will be deemed acceptance of the work as constructed.

If the size or complexity of the work warrants such an action, an agency representative and the resident engineer should make a preliminary joint inspection to correct minor deficiencies before the final inspection described above.

The resident engineer must record in writing preliminary and final joint field inspections, noting what actions were necessary to complete the work to the satisfaction of the agency representative. If the agency representative is satisfied with the completeness but declines concurrence in writing, record this situation.

3-514 Cost Reduction Incentive

3-514 Cost Reduction Incentive

Caltrans encourages contractors to develop and implement innovative approaches to construction projects. When new approaches result in construction cost savings, Caltrans and the contractor may share the savings in construction cost. Section 5-1.14, "Cost Reduction Incentive," of the *Standard Specifications*, specifies the method and procedure for sharing construction cost savings. A contractor's proposal made in accordance with Section 5-1.14 is called a cost reduction proposal.

The special provisions may allow for the contractor and engineer to organize and participate in a "value analysis" workshop. The workshop's purpose is to identify value-enhancing opportunities that would reduce the total project cost, time of construction, or traffic congestion. Items identified in the workshop could be developed into cost reduction proposals.

Section 5-1.14 applies only to the actual cost of construction. Savings in construction engineering, maintenance, operations, safety, and traffic services, among other items, are not eligible for sharing with the contractor.

3-514A Procedure

Handle cost reduction proposals as follows:

- After discussing the merits of a potential cost reduction proposal with the resident engineer, the contractor may submit a written proposal for approval. The initial written proposal may be preliminary in nature, but for Caltrans to evaluate the anticipated cost savings or other value enhancement, the proposal must provide enough of the information required by Section 5-1.14, "Cost Reduction Incentive," of the *Standard Specifications*. Thus, the proposal must include information regarding the following:

  1. Any construction effects related to staging, right-of-way, or environment
  2. Any required permits or permit modifications
  3. Maintenance or enhancement of essential functions or characteristics of the project such as service life, reliability, economy of operation, ease of maintenance, desired appearance, conformity to design, safety and other applicable standards, and the time within which the engineer must make a decision on the proposal.

- With assistance from the resident engineer, the construction engineer must coordinate Caltrans' evaluation of the written proposal by the date requested by the contractor.

- Consider the following factors in determining whether or not a proposal is acceptable. (Do not include any cost benefit resulting from these factors in the actual computation of net savings in construction costs.)

  1. Any engineering, environmental, legal or administrative considerations making the proposal impractical or unacceptable.
  2. The relationship of net savings to the cost of evaluating and implementing the proposal
  3. Any total benefit to the public including construction savings or reduced engineering costs
  4. Improved operations
  5. Reduced maintenance
  6. Improved safety and traffic service or other values that clearly favor the proposal

- Compute a cost reduction proposal's net savings due to the changed work in accordance with the methods detailed in Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications*. The net savings must result from the difference in the actual cost of doing the work in accordance with the contract plans and specifications as originally planned and the actual cost of doing the work based on designs, methods, labor, equipment and materials as changed by the proposal. In determining the net savings, exclude from consideration the contractor's engineering and other costs incurred in preparing the proposal. Also exclude Caltrans' cost of evaluating the proposal, including any portion of this effort for which the contractor paid.

- If the submitted proposal appears acceptable, but Caltrans' anticipated engineering costs are high, the contractor must stipulate in writing a willingness to share such costs before the proposal will be evaluated further. This willingness must be stipulated whether or not the proposal is ultimately adopted. Such a letter from the contractor provides the district with the authority to deduct engineering costs from progress payments. To record Caltrans engineering costs, proceed as follows:

  1. For the phase 3 expenditure authorization, establish a subjob number. Establish this number regardless of the proposal's subsequent approval or rejection. Charge all time spent evaluating the proposal to the subjob number.
  2. To provide the means of segregating costs, the district must immediately prepare and submit for master file the subjob number. After executing the change order for the cost reduction proposal, do not charge construction engineering to the subjob number.
  3. In conformance with Section 5-1.14, "Cost Reduction Incentive," of the *Standard Specifications*, you may deduct from progress payments a portion of Caltrans' engineering costs for evaluating the cost reduction proposal. Use the following method to determine the deduction. If Caltrans' engineering costs (A) exceed Caltrans' share (B) of the total computed net savings, deduct the difference (A minus B) from progress payments. Inform the contractor of the reason for any deductions.

- If the submitted proposal provides for a substantial benefit to the public but no net savings, the engineer may still proceed with issuing a contract change order based on public benefit. However, the contract change order would not be written as a contract change order for a cost reduction proposal but as an engineer-requested contract change order.
- If the district construction deputy director (or if applicable, the Division of Construction contract reviewer) determines that a preliminary written proposal is acceptable, the contractor may submit a complete proposal. The proposal must contain all information required by Section 5-1.14, "Cost Reduction Incentive," of the *Standard Specifications.* This information must be in sufficient detail to enable a final review and approval. The information provided should answer all questions that arose from Caltrans' review of the preliminary proposal. It must also include applicable calculations, revised plans, and revised specifications. To resolve issues, the contractor and the resident engineer may need to have additional meetings and discussions. Before forwarding the proposal for final review by the appropriate units, ensure the proposal is complete.
- In accordance with Section 5-1.14, "Cost Reduction Incentive," of the *Standard Specifications,* prepare a contract change order to authorize the cost reduction proposal. For guidance in preparing a contract change order for a cost reduction proposal, see Section 5-313, "Cost Reduction Proposal," in this manual. Carefully consider the contract change order's clauses covering payment to the contractor. In the contract change order, resolve all compensation and other issues related to the proposal. Before starting the authorized work, the contractor must execute and the engineer must approve the contract change order.

Section 6 Control of Materials

3-601 General

3-602 State-Furnished Materials

3-603 Defective Materials

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3-605 Certificates of Compliance
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Section 6 Control of Materials

Section 6
Control of
Materials

3-601 General

3-601
General

The service life of a properly designed highway depends on the construction method and quality of materials used in the highway's construction. The resident engineer must ensure that materials used in the work comply with specifications. This section presents some general guidelines for ensuring that specifications are met. More specific instructions are covered in Chapter 6-2, "Acceptance of Manufactured Material and Sampling Methods," of the *Construction Manual* (manual)." Section 6, "Control of Materials," of the *Standard Specifications*, describes the contractor's responsibilities regarding materials.

Caltrans' Office of Materials Engineering and Testing Services (METS) will assign inspectors for materials that require inspection during manufacture or at the source of supply. Resident engineers must obtain a properly completed form CEM-3101, "Notice of Materials to Be Used," which lists the contractor's sources of materials and the location at which those materials can be inspected. Review this form to ensure that all expected materials are included. To check the form, use as a guide Table 6-2.1, "Inspection of Fabricated and Manufactured Materials," at the end of Section 6-2, "Acceptance of Manufactured Material and Sampling Methods." The resident engineer should forward the completed form to METS. METS will ensure the proper assignment of inspectors and notify the suppliers of the required inspections.

Do not allow any material to be incorporated into the work until the required evidence or certificate of inspection has been received and until the field inspection has been completed at the job site.

3-602 State-Furnished Materials

3-602
State-Furnished
Materials

Section 6-1.02, "State-Furnished Materials," of the *Standard Specifications* describes the conditions under which the contractor can receive state-furnished materials. The resident engineer's duties related to these materials include the following:

- Review the special provisions for materials to be furnished. For materials manufactured specifically for the project, such as signs, check with the district unit responsible for ordering them to ensure they will be available when the contractor requests.
- Obtain the contractor's written request for all state-furnished materials. Retain a copy of the request in the project file (under Category 52, "Charges to Total Contract Allotment").
- Ensure the contractor signs a receipt for the materials when they are delivered. Retain a copy of the receipt in the project file.
- If state-furnished materials are damaged or lost, deduct a sufficient amount from the contractor's monthly estimate to cover the estimated cost of repair or replacement, pending such repair or replacement.

- Ensure the return of state-furnished material that has not been used in the work.

3-603 Defective Materials

3-603 Defective Materials

Section 6-1.04, "Defective Materials," of the *Standard Specifications*, provides for the rejection and removal of material that does not meet specification requirements. Except for material that is permitted to remain in place under the specifications for "contract compliance" and "operating range", reject material represented by a test result not meeting the specified requirement. See Section 3-508, "Removal of Rejected and Unauthorized Work," of this manual for guidelines on removal of rejected and unauthorized work.

3-604 Trade Names and Alternatives

3-604 Trade Names and Alternatives

When trade names are used to designate required products, the contractor may furnish other products that are of equal or better quality. Consult with the responsible unit (the design unit, traffic unit, or METS, among others) in making decisions about the acceptability of substitutes.

3-605 Certificates of Compliance

3-605 Certificates of Compliance

For a discussion about certificates of compliance, refer to the subsection entitled "Materials Accepted on the Basis of a 'Certificate of Compliance'" in Section 6-2, "Acceptance of Manufactured Material and Sampling Methods" of this manual. Foreign Materials Section 6-1.08, "Foreign Materials," of the *Standard Specifications*, includes the requirements for using foreign materials. The resident engineer must ensure the receipt of the required certificates of compliance and mill test reports.

The Buy America requirements contained within the Code of Federal Regulations (23CFR635.410) applies to all Federal Aid projects. For these projects, the preconstruction conference should include a discussion of the Buy America requirements.

These requirements do not prevent a minimal use of foreign steel materials. An exemption to the Buy America requirements is allowed if the cost of such materials used does not exceed one-tenth of 1 percent (0.1 percent) of the total contract cost or $2,500, whichever is greater. The contractor must provide the resident engineer with acceptable documentation of the quantity and value of any foreign steel before incorporating such materials into the work. This exemption applies as a one-time total exemption for each contract, not for each purchase.

To be considered a domestic material, all manufacturing processes must take place domestically. Manufacturing begins with the initial melting and mixing and continues through the bending and coating stages. If a domestic product is taken out of the United States for any process, it becomes a foreign source of material.

The following is a listing of materials requiring, and not requiring, certification under the provisions:

<u>3-605A Materials Requiring Certification:</u>

- Structural steel (including sheet piling, pipe piling, H-piling, shapes and plates, angles, channels, and tees)
- Reinforcing steel and wire mesh
- Miscellaneous steel, including items such as bearing plates, expansion dams, and earthquake restrainers, among other items

- Steel sign structures
- Iron and steel pipe and corrugated steel pipe
- Prestressing bars, wires, and strand
- Steel wire and fence fabric
- Steel fence, guard railing, marker, and delineator posts
- Steel bin walls, sound walls, and roofing and siding for buildings
- Steel conduit
- Structural steel bolts (both high-strength and ASTM: A-307)
- Anchor bolts
- Prestressing hardware

3-605B Materials Not Requiring Certification:

- Controllers and service cabinets
- Pumping equipment
- Miscellaneous hardware items
- Electrical materials and fixtures
- Irrigation materials and plumbing fixtures
- Machinery
- Iron castings

3-606 Out-of-State Fabrication

3-606 Out-of-State Fabrication

Sections 49, 51, 55, 56, and 75 of the *Standard Specifications* include reductions in payment for fabrication at some distance from Sacramento and Los Angeles. In addition, some special provisions may modify the amount to be deducted. Deduct the appropriate amount, applying it as an administrative deduction on estimates that include payment for the item.

3-607 Local Materials

3-607 Local Materials

Section 6-2, "Local Materials," of the *Standard Specifications*, covers the requirements for the use of local materials and the resident engineer's responsibility for testing the materials

Section 6-2.02, "Possible Local Material Sources," of the *Standard Specifications* requires the contractor to execute certain documents when obtaining materials from property owners with whom Caltrans has arranged the use of such materials. These documents are titled "Supplemental Materials Site Agreement (1) and (2)." Samples of agreement (1) and agreement (2) follow:

Supplemental Materials Site

Agreement (1)

Contract No. _____
District _____
Date _____

TO:_____
District Director, District _____
_____, California
Dear _____,

In accordance with Section 6.2, "Local Materials," of the *Standard Specifications*, here is the agreement for using the materials source for the subject Contract, as required before removal of said materials:

WHEREAS, Contractor has entered into Contract No. ____ with the State of California, Department of Transportation, hereinafter called "Department," for the performance of _____ work on road _____, and

WHEREAS, Department has entered into an agreement dated _____,with _____for the obtaining of materials from the property described in said arrangement.

NOW THEREFORE, pursuant to the terms of said arrangement and of said Contract No. _____, Contractor hereby agrees to comply with all terms and conditions of said arrangement between the Department and said property owner and further agrees to hold said property owner harmless from all claims for injury to persons or damage to property resulting from Contractor's operations on owner's property.

DATE _____ _____
Contractor
By _____
Authorized Agent
Title _____

Origin.-Dist. Director
Dupl.-Contr.
Trip. -Prop. Owner
Quad. -Res. Engr.

Supplemental Materials Site

Agreement (2)

Contract No. _____
District _____
Date _____

TO: _____
District Director, District _____
_____, California
Dear _____,

In accordance with Section 6.2, "Local Materials," of the *Standard Specifications*, here is the agreement for using the materials source for subject Contract, as required before removal of said materials:

WHEREAS, Contractor has entered into Contract No. _____ with the State of California, Department of Transportation, hereinafter called "Department," for the performance of _____ work on road _____, and

WHEREAS, pursuant to the authority of said Contract, _____, Contractor and _____, Owner, have entered into an agreement under which Contractor may obtain materials from Owner's property.

NOW THEREFORE, pursuant to said Contract No. ____, Contractor and Owner hereby notify Department that materials obtained by Contractor from Owner's property will be obtained pursuant to agreement between Contractor and Owner and not pursuant to the arrangement between Department and Owner, dated _____, 19____, and Owner specifically agrees that the Department is hereby released from any and all obligations to Owner under Department's said arrangement with Owner.

DATE _____ _____
Owner

DATE _____ _____
Contractor
By_____ Authorized Agent
Title_____

Origin. -Dist. Director
Dupl. -Contr.
Trip. -Prop. Owner
Quad. -Res. Engr.

When the contractor makes new agreements with property owners, revising the terms of the state-owner agreement, the new agreements supersedes Caltrans' agreement. The resident engineer must review these agreements to ensure that the state is relieved of its obligations under the terms of the original agreement.

The resident engineer must determine whether royalties should be deducted from payments to the contractor. Normally, under agreement (1) above, Caltrans will pay the owner of the materials site, and therefore, deductions must be made from estimates. In the case of county-consummated agreements, royalties usually are deducted in a similar way.

3-607A Compliance with Materials or Disposal Agreements

The specifications for both material sources and disposal sites state the resident engineer may require the contractor to submit written evidence that the owner is satisfied that the contractor has satisfactorily complied with the provisions of either agreement (1) or (2). The resident engineer must determine, preferably through written evidence, whether or not the owner is satisfied.

If the owner is not satisfied, the district must determine what additional work is necessary before recommending acceptance of the contract. The district must also advise the contractor accordingly. The district must not delay recommending acceptance if the resident engineer determines the contractor has complied with the terms of the agreement.

3-607B Public Interest Determination

Whenever local materials will be removed from mandatory sources, the resident engineer must write a public interest determination if the project includes federal financing. Mandatory sources include sources within state right-of-ways but outside the project's limits. Normally, the resident engineer makes the determination before advertising. The purpose of a public interest determination is to establish clearly that a designated material source will serve the public interest, versus simply public or private property.

Occasionally it becomes necessary to obtain additional embankment material from outside the local area even though the contract does not contain a clause allowing the contractor to import non-local material. Thus, the contract does not have an item for "imported borrow." Under these circumstances, it is normal practice for Caltrans to locate a source for this material.

If the contract change order directs the contractor to obtain material from Caltrans' chosen source, the Federal Highway Administration (FHWA) considers the source mandatory. The FHWA then requires written approval of a public interest determination before approval of the contract change order.

At a minimum, the public interest determination, written by the resident engineer, must include the following:

- The reason the chosen source is the most economical. If the determination is not based on economy, other reasons such as public safety or convenience must be included.
- The alternatives considered.
- The effect on the value of the material site.

The FHWA must then approve the resident engineer's determination. One method of submitting a public interest determination for approval is to include the required statements on Form CEM-4903, "CCO Memorandum." The Division of Construction will pursue approval of the public interest determination before approval of the contract change order. To expedite approval of the contract change order, the resident engineer should, whenever possible, send the public interest determination to the Division of Construction before submission of the contract change order.

The above requirements do not apply to "local borrow," as defined in Section 19-7, "Borrow Excavation," of the *Standard Specifications*.

3-607C Disposal of Material

Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the *Standard Specifications*, and Section 7-1, "Environmental Rules and Requirements," of this manual, cover the requirements for the contractor's disposal of materials (unless modified by special provisions). When required to execute documents related to disposal sites, the contractor should use agreements similar to those shown earlier in this section for material sites, with the wording modified to indicate disposal sites instead.

3-608 Testing

3-608 Testing

The *Standard Specifications* contain references to the standards and tests of the American Association of State Highway and Transportation Officials (AASHTO) and the American Society for Testing and Materials (ASTM). These standards and tests may, or may not, be readily available to the resident engineer. Note any references to these tests well in advance of need, and obtain any necessary copies of them from the district materials engineer. It is not practical to supply each resident engineer with complete AASHTO and ASTM standard test procedures.

Whenever samples are taken from materials sites, the resident engineer must ensure the samples are representative of material being used. Degradation and segregation may occur in aggregates between the processing operation and their incorporation in the work. The resident engineer cannot assume that material satisfactorily tested at the source or at the processing plant is still satisfactory at the job site. To ensure specification compliance, test at the frequencies shown in the specifications as the material is being incorporated into the work.

3-608A Operating Range and Contract Compliance

Section 25, "Aggregate Subbases," Section 26, "Aggregate Bases," Section 27, Cement-treated Bases," Section 28, "Lean Concrete Base," Section 39, "Asphalt Concrete," and Section 90, "Portland Cement Concrete," of the *Standard Specifications*, all contain provisions for an acceptable range of test results and unacceptable results for aggregate gradation tests. If a test result fails to meet the requirements of the operating range but meets contract compliance, the contractor usually needs to make some change in operations to ensure subsequent test results meet the "Operating Range" requirements. The resident engineer should document the contractor's actions and any off-site testing done before the next day's work.

If a test result fails to meet the specified value for contract compliance, the result should be treated just like any other failing test result. However, if the contractor writes a request, the resident engineer may consider leaving the material in place and applying the specified deduction, if the specifications allow. The contractor's written request, along with documentation for reasons for leaving the material in place and the contractor's actions, is sufficient for the contract records. A contract change order accepting out-of-specification material is not required in this case because the specifications provide the procedure for acceptance.

The resident engineer must inform the contractor promptly of test results that indicate unacceptable or borderline work. The contractor must be advised that all test results are available for the contractor's inspection. Accordingly, test results must remain in the project files for ready accessibility.

3-609 Testing by Contractor

3-609 Testing by Contractor

The contractor must be satisfied at all times that the quality of materials entering the work and the work performed, regardless of who supplies the materials or performs the work, will meet the contract requirements. For acceptance of materials or work, resident engineers must not use as documentation any tests the contractor performs to control the work. Perform and record acceptance tests as required by Section 6-1, "Sample Types and Frequencies," of this manual.

Section 7 Legal Relations and Responsibility

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Section 7 Legal Relations and Responsibility

Section 7
Legal Relations
and Responsibility

3-701 Laws to Be Observed

3-701
Laws to Be
Observed

According to the specifications, the contractor must be familiar with and comply with all laws, regulations, and ordinances that affect the labor, materials, or conduct of the work. However, the specifications do not intend or require that the resident engineer exercise police enforcement power. If the engineer learns that the contractor has violated a work-related law or regulation, the engineer must bring the matter to the contractor's attention in writing.

3-701A Reporting Apparent Attempts at Fraud on Construction Contracts
Resident engineers are confronted occasionally with situations where contractors or their subcontractors or suppliers attempt to obtain improper additional payment.

These matters may differ in magnitude and intent, and minor situations may be resolved satisfactorily at the project level. However, certain fraudulent acts, such as presenting false weight certificates, padding the number of loads of a commodity delivered, or tampering with scales, may require special investigation and appropriate action. Such investigations are confidential and begin with a discussion between the resident engineer and the construction engineer. To request a special investigation, write a letter to the construction field coordinator.

3-701B Labor Code Requirements and Fair Labor Standards Act
For the resident engineer's duties with regard to Labor Code requirements and the Fair Labor Standards Act, see Chapter 8, "Employment Practices," of the *Construction Manual* (manual).

3-701C Contractor's Licensing Laws
According to the specifications, all contractors and bidders must be licensed. For bidders and prime contractors, the Office of Contract Awards and Services in the Office of Office Engineer verifies compliance with the specifications. If you become aware that a prime contractor or subcontractor is not licensed for the work being performed, notify the California Contractors State License Board.

3-701D Vehicle Code
In any areas open to public traffic within the project's limits, the contractor is not exempt from Vehicle Code requirements. Equipment that fails to comply with the Vehicle Code must not be operated on detours or any other roadway open to public traffic.

3-701D (1) Weight Limitations

Except for special conditions described in Section 7-1.02, "Load Limitations," of the *Standard Specifications*, all equipment hauling materials over roads or streets open to public traffic to, from, or within the project must comply with weight limitations required by the Vehicle Code. To enforce weight limitations for overloads

hauled over public roads and streets, follow the procedure outlined below. The permitted tolerance described below is selected to make Caltrans actions compatible with routine enforcement procedures used by the California Highway Patrol (CHP). Here is the procedure to follow:

- The assistant resident engineer receiving a weight slip indicating an overload may accept a load that is not more than 90 kg over the legal gross weight. However, advise the contractor immediately that if the violation continues, Caltrans will refuse to accept such loads and will notify the CHP.
- When a weight slip indicates that a load is more than 90 kg over the legal gross weight, reject the load and notify the CHP that overloads are being hauled.
- Prohibit rejected material from being used in the work unless the load is reduced to or below the legal maximum weight (not including the tolerance) and is again weighed to establish a new weight.
- Record the identification of rejected weight slips in the daily report.

The objective of the above procedure is to discourage hauling overloads. Minor variations in the above procedure are acceptable provided the objective is met.

3-701E Trench Safety

The Office of Structure Construction's *Trenching and Shoring Manual* provides technical guidance for analyzing designs of trenching and shoring systems. It also contains information regarding California's legal requirements for trench safety.

3-701F Falsework Erection or Removal

Detailed instructions for reviewing falsework for bridges or other major structures are contained in the Office of Structure Construction's *Falsework Manual*. When the erection or dismantling of falsework is over or adjacent to a traveled way, project personnel must do the following:

- Before the erection or removal of falsework, determine the exact method of operation the contractor proposes to use.
- If any possibility exists that a material or equipment failure or human error could endanger the public, ensure traffic is rerouted or temporarily stopped during critical portions of the erection and removal operations.
- Normally, the contract will provide necessary detours or other restrictions such as the time of day when certain operations may be performed. In the absence of specific contract requirements, require the contractor to take the necessary measures in accordance with Section 7-1.09, "Public Safety," of the *Standard Specifications*.
- Ensure unplanned detours are paid for in accordance with Section 4-1.04, "Detours," of the *Standard Specifications*.
- Notify the Transportation Permits Branch of the upcoming reduction of vertical clearance. See "Impaired Clearance (temporary)" later in this section.

3-701G Air Pollution Control

See Chapter 7, "Environmental," of this manual.

3-701H Water Pollution

See Chapter 7, "Environmental," of this manual.

3-701I Use of Pesticides
The resident engineer's duties regarding pesticide use are included in Section 4-20, "Erosion Control and Highway Planting," of this manual.

3-701J Sound Control Requirements
See Chapter 7, "Environmental," of this manual.

3-702 Load Limitations

Section 7-1.02, "Load Limitations," of the *Standard Specifications* permits overloads within the project limits under certain conditions. The special provisions may also provide conditions under which the contractor may haul overloads. However, the contractor must provide any necessary protective measures and repair any damage resulting from overloads.

The resident engineer, in accordance with Caltrans policy for overloads, will handle requests for nonrepetitive overloads on completed work within the contract limits. You can obtain details from the Transportation Permits Branch. The *Bridge Construction Records and Procedures Manual* contains procedures for allowing certain overloads on structures.

3-703 Safety and Health Provisions

The contractor must conform to all Division of Occupational Safety and Health standards. See Section 2-1, "Safety," of this manual for guidelines for administering the contract's safety requirements.

3-704 Public Convenience

The following five sections provide guidelines for enforcing the provisions in Section 7-1.08, "Public Convenience," of the *Standard Specifications* and contain discussion of other topics related to the passage of public traffic through construction projects.

3-704A Convenience of the Public and Public Traffic
The contractor has a contractual obligation to provide for the convenience of the public and public traffic. Section 7-1.08 requires that operations be conducted in such a way as to prevent the least possible obstruction and inconvenience to the public. The public consists of anyone passing through or affected by construction operations, including pedestrians and residents, as well as vehicular traffic.

The resident engineer must ensure the contractor has made adequate provisions for public convenience when the specifications leave the manner of providing for convenience to the contractor's discretion. The resident engineer must also ensure the contractor does not unnecessarily delay or interfere with traffic for the contractor's own benefit or convenience.

The "least possible obstruction and inconvenience" will always depend on judgment. What is permissible should be that which is accepted as good practice in the industry, complies with the specifications, and does not materially diminish the degree of convenience and free passage through the area that existed before construction. For instance, do not accept a trench that lies adjacent to a traffic lane for the entire length of the project and that was excavated just to suit the contractor's convenience. A length of trench sufficient to accommodate an orderly and workmanlike progression of operations is reasonable. Likewise, it is physically impossible to carry on a series of operations between an existing roadway and adjoining properties that have access to the roadway without temporarily disrupting the access. However, whether permanent or temporary, restore the access as soon as possible without waiting for the work to be completed past all the adjacent access points.

The intent of Section 7-1.08, "Public Convenience," of the *Standard Specifications* is to ensure public convenience, not a minimum construction cost. Frequently, the contractor can achieve both through careful planning and skillful operation.

3-704B Contingency Plans for Reopening Lane Closures

The special provisions for contracts that allow lane closures require the contractor to prepare a contingency plan for reopening closed lanes. The contractor's contingency plan must include two elements:

1. A critical path analysis of the operation. This analysis must include a detailed review of each segment of the operation, including placing and removing traffic control.
2. Actions to be taken if the operation is not proceeding as planned and needs to be terminated early. Early termination can consist of either stopping the contractor's operation so that lanes can be reopened within the specified time limits or stopping the contractor's operation to reopen the lanes before the time specified for reopening.

When an operation is terminated before the time the specifications allow because of circumstances beyond the contractor's control, consider granting time, compensation, or both, within the terms of the contract. If the operation is terminated before completion of the planned work because of circumstances within the contractor's control or because of equipment breakdown, do not allow compensation and charge a working day as appropriate.

3-704C Maintenance and Improvement of Passageway Through Construction

Normally, paved detours will be provided for the passage of public traffic during construction. On low volume roads where the cost of detour construction is unreasonably high, the contract may provide for traffic to pass through the work during the grading and structural section operations. Section 7-1.08 specifies the responsibility of the contractor for providing reasonably smooth and even surfaces for passage of public traffic through the work. This section also specifies Caltrans' responsibility for paying for the cost of maintaining the surface that would carry public traffic. Any ordered construction to provide improved conditions for the convenience of the traveling public is considered to be detour construction and is paid for as provided in Section 4-1.04, "Detours," of the *Standard Specifications*. Also, any ordered construction or improvement of facilities required for pedestrians or the resident public, not otherwise provided for in the contract, is to be paid for in a like manner.

3-704D Relief From Responsibility for Damage by Public Traffic

Only in some cases will Caltrans pay to repair damage to completed permanent facilities caused by public traffic. Section 7-1.08 covers such exceptions. Completed permanent facilities are any features constructed by the contractor that will become a permanent part of the project. Caltrans will not pay for damage to temporary facilities, such as falsework and forms.

The facility need not be 100 percent complete for the contractor to be compensated, but it must be functional. Caltrans must not pay for damage from public traffic to facilities that are not considered functional yet. For instance, guardrail posts or guide marker posts or a bridge still supported by falsework would not be considered functional. However, for a concrete barrier that only requires a specified light abrasive blast finish, Caltrans may pay for damage caused by public traffic because the barrier is functional.

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 Highway 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.

Pay as extra work any work the contractor does to maintain and repair damage to existing facilities (except for damage caused by the contractor).

If the highway in question is a state highway, Caltrans' maintenance forces must maintain the highway. A clear understanding must exist between the maintenance region manager and the resident engineer about which portions of the highway Caltrans' maintenance forces will continue to maintain during the project's construction. The same understanding must be reached when the project includes facilities normally maintained by local agencies.

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.

<u>3-707A Evidence of Insurance</u>
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

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*, the resident engineer must not allow the contractor to dispose of material outside the right-of-way. When all other conditions have been met, the resident engineer must give the contractor written permission for disposal sites not covered by an agreement between the 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

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Section 8 Prosecution and Progress

Section 8 Prosecution and Progress

3-801 Subcontracting

3-801 Subcontracting

Contractors can use subcontractors on their projects provided the subcontractor and the prime contractor comply with the applicable contract specifications and with state and federal laws and regulations. When projects use subcontractors, the resident engineer must primarily focus on the following:

- Always know which subcontractors are working on the project.
- Of the contract amount, ensure that subcontractors perform no more than 50 percent (or the percentage allowed by the special provisions), excluding Specialty Items as identified in the special provisions.
- Ensure that listed subcontractors are not illegally removed or replaced.
- Ensure the prime contractor achieves the subcontracting level pledged to meet requirements of the disadvantaged business enterprise (DBE) and the disabled veteran business enterprise (DVBE) when the contract was awarded. For more information on the DBE and DVBE subcontracting requirements, see Section 8-3, "Disadvantaged Business," of the *Construction Manual* (manual).
- Ensure adherence to the provisions of the Subletting and Subcontracting Fair Practices Act.

In the same manner as for other contractual obligations, construction personnel must review the contract and administer the subcontracting provisions.

3-801A Amount of Work Subcontracted

Section 8-1.01, "Subcontracting," of the *Standard Specifications,* requires that the contractor perform no less than 50 percent of the work using the contractor's own organization, excluding Specialty Items as identiefied in the special provisions. The special provisions may revise this percentage.

The percentage of work subcontracted is calculated for first-tier subcontractors only. A contractor's organization must include only workers employed and paid directly by the prime contractor and only equipment owned or rented by the prime contractor, with or without operators.

The following examples portray common situations encountered when attempting to determine if work should be considered as subcontracted:

- The contractor pays an hourly rate for work performed at the job site. The contractor purchases material for curing seal by the tonne, but pays for spreading the material by the hour. Consider this work as completed by the contractor's own forces.
- The contractor pays a unit price or lump sum for work performed at the job site. The contractor purchases cement for cement-treated base, and the price per tonne includes spreading on the project. Consider the work as subcontracted.

- Materials are purchased "FOB" to the job site from a commercial source. (FOB is the abbreviation for "free on board" and means the price includes delivery to the job site.) Do not consider the delivery as subcontracted work.
- Materials are purchased FOB at a location off the project and delivered by a commercial freight line. Do not consider the hauling as subcontracted work.
- Materials are obtained at a location off the project and hauled to the project by a truck broker or independent trucker. Do not consider the hauling as subcontracted work.

In unusual cases, the resident engineer should discuss the situation with the construction engineer. If the situation then indicates that additional information is necessary but only available through an inspection of the contractor's records, discuss with Division of Construction personnel the possibility of an audit.

3-801B Calculating the Amount of Work Subcontracted

The contractor must submit Form CEM-1201, "Subcontracting Request," stating what portion and dollar amount of an item will be subcontracted. The resident engineer must verify the amount. Any rational method of determining the amount will be acceptable. For example, methods using the following would be acceptable:

- The percent of an area, volume, or length
- The portion applicable to material cost
- Or, the portion of labor and equipment cost

When an entire item is subcontracted, the amount is the prime contractor's bid price, not the amount of the subcontract. When a portion of an item is subcontracted, the value of the work subcontracted will be based on the percentage of the contract item bid price. The following is an example of a method to calculate the amount subcontracted:

Bid price of contract item =	$100,000.00
Estimated cost of performing the entire item work (force account or similar estimate) =	$ 80,000.00
Estimated cost of subcontracted portion (force account or similar estimate, not necessarily subcontractor's bid) =	$ 40,000.00
Percent of item subcontracted = 40,000 ÷ 80,000 = 50% Amount subcontracted = 0.50 x 100,000 =	$ 50,000.00

To ensure the contractor is not requesting approval for a firm other than those firms listed in the bid documents, the resident engineer must check the DBE listing and the Subletting and Subcontracting Fair Practices Act listing. If a discrepancy is noted, the resident engineer must advise the contractor and ask for an explanation. The resident engineer must not approve the subcontracting request until the contractor provides an acceptable explanation.

3-801C The Subletting and Subcontracting Fair Practices Act

Sections 4100 through 4114 of the Public Contract Code are called the "Subletting and Subcontracting Fair Practices Act" and apply to Caltrans construction projects. This act is designed to prevent prime contractors from "bid shopping" for subcontractors after bids are opened and the low bidder is known.

The act requires that subcontracted work in excess of 0.5 percent of the contractor's bid amount or $10,000 (whichever is greater), must be listed in the prime contractor's bid proposal. Not listing a subcontractor indicates that the prime contractor will do the work with the contractor's own forces. The act does not require the listing of second-tier subcontractors, vendors, and suppliers, or subcontractors performing temporary work, such as temporary traffic striping.

All subcontracted work in excess of 0.5 percent of the contractor's bid amount must be listed if the work to be performed is a building project such as a maintenance station or other off-highway project.

The resident engineer must ensure that the listed subcontractor performs the work or that the contractor complies with the act regarding substitution.

Listed subcontractors can be substituted only if the act's procedures have been followed.

3-801C (1) Substitution Process

To remove a subcontractor listed in the bid documents, the prime contractor must submit a written request. The contractor can request the removal of a listed subcontractor for the following reasons:

- The subcontractor fails or refuses to execute a written contract.
- The subcontractor becomes bankrupt or insolvent.
- The subcontractor refuses to perform the subcontract.
- The subcontractor fails or refuses to meet bond requirements.
- The prime contractor proves to the awarding authority that the subcontractor was listed as the result of an inadvertent clerical error. This reason can only be used shortly after bid opening.
- The subcontractor is not licensed.
- Caltrans determines that the listed subcontractor's work is substantially unsatisfactory.

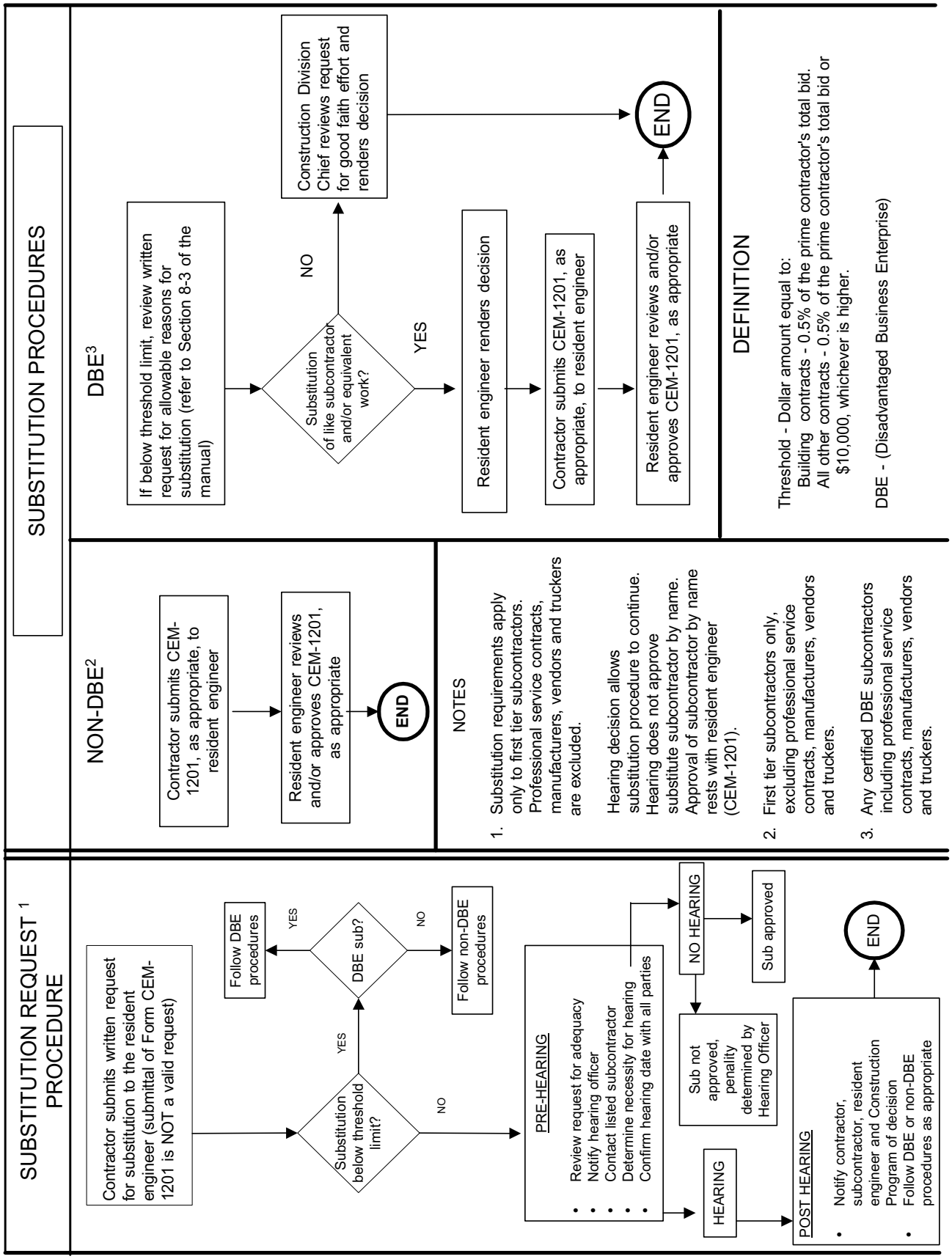
For more detail on the authorized reasons for removing listed subcontractors, see Section 4107 of the Public Contract Code.

When the prime contractor requests a substitution, proceed as follows:

- Send the request, together with the reason, to the district construction office.
- If the prime contractor indicates that the listed subcontractor agrees with the removal, the prime contractor should submit a letter from the subcontractor agreeing with the removal. To verify the subcontractor wants to be removed, the resident engineer must also check with the subcontractor.

- If the subcontractor does not agree with the removal, the prime contractor must describe the reasons for the removal, and the reasons must match the authorized reasons described under the Subletting and Subcontracting Fair Practices Act.
- The district must notify the listed subcontractor by certified mail that the contractor has requested removal. The district must also provide a copy of the contractor's request to the subcontractor. The listed subcontractor has five working days to submit to Caltrans a written objection to the substitution. Failure to file a written objection constitutes the listed subcontractor's consent to the substitution.
- If the listed subcontractor does not respond within five working days, the resident engineer must approve the removal of the listed subcontractor. The resident engineer must then approve the new subcontractor (if qualified), following the guidelines under "Procedure for Approval or Acknowledgement of Subcontractors" in this section. If the removed subcontractor's firm was a DBE, the contractor must undertake efforts to replace that firm with another DBE. See Section 8-3, "Disadvantaged Business," of this manual.
- If the listed subcontractor submits timely written objections to the substitution, the district will conduct a hearing. Normally, the hearing officer is the district construction deputy director. The prime contractor and the subcontractor objecting to the substitution must receive written notice of the hearing a minimum of five days before the hearing.
- Before the hearing, ensure the allegations are evaluated to determine whether a Caltrans attorney needs to attend the hearing to develop the record on a legal issue.
- The hearing can be informal, without strict rules of evidence. To substantiate the allegations, however, documents must be obtained from both parties. Either the hearing officer or another Caltrans representative must also develop a line of questioning to ensure sufficient evidence exists upon which Caltrans can base its decision about the request. Moreover, if the hearing officer requires legal or other assistance during the substitution or hearing process, the district must contact the construction field coordinator, who will arrange for such assistance as appropriate.
- During the hearing, tape recording can be used to assist in taking notes.
- After the hearing, the hearing officer will issue written findings, conclusions, and a decision on the substitution request. As soon as possible after the hearing, the prime contractor and the objecting subcontractor must receive a copy of the decision by certified mail return receipt. The Division of Construction must also receive a copy. If the prime contractor is found to be in violation of the act, the contractor must be assessed a penalty, taken as an administrative deduction, ranging from 0 to 10 percent of the subcontract amount. The district will determine the penalty amount, which will vary depending on the circumstances involved. The district hearing officer's finding is the final Caltrans administrative finding on the application and enforcement of the act.

Table 3-8.1 The following chart outlines the foregoing substitution process:



The following presents typical examples of some of the more common violations of the act by a prime contractor:

- Subcontracting work that was not listed as subcontracted work.
- Using a subcontractor that was not listed.
- Substituting subcontractors without Caltrans' consent.
- Performing work that a subcontractor was designated in the bid documents to perform.

If these or any other violations occur, proceed as follows:

- The resident engineer must discuss the apparent violations with the construction engineer.
- If the construction engineer agrees an apparent violation has occurred, send the prime contractor a letter stating the following:

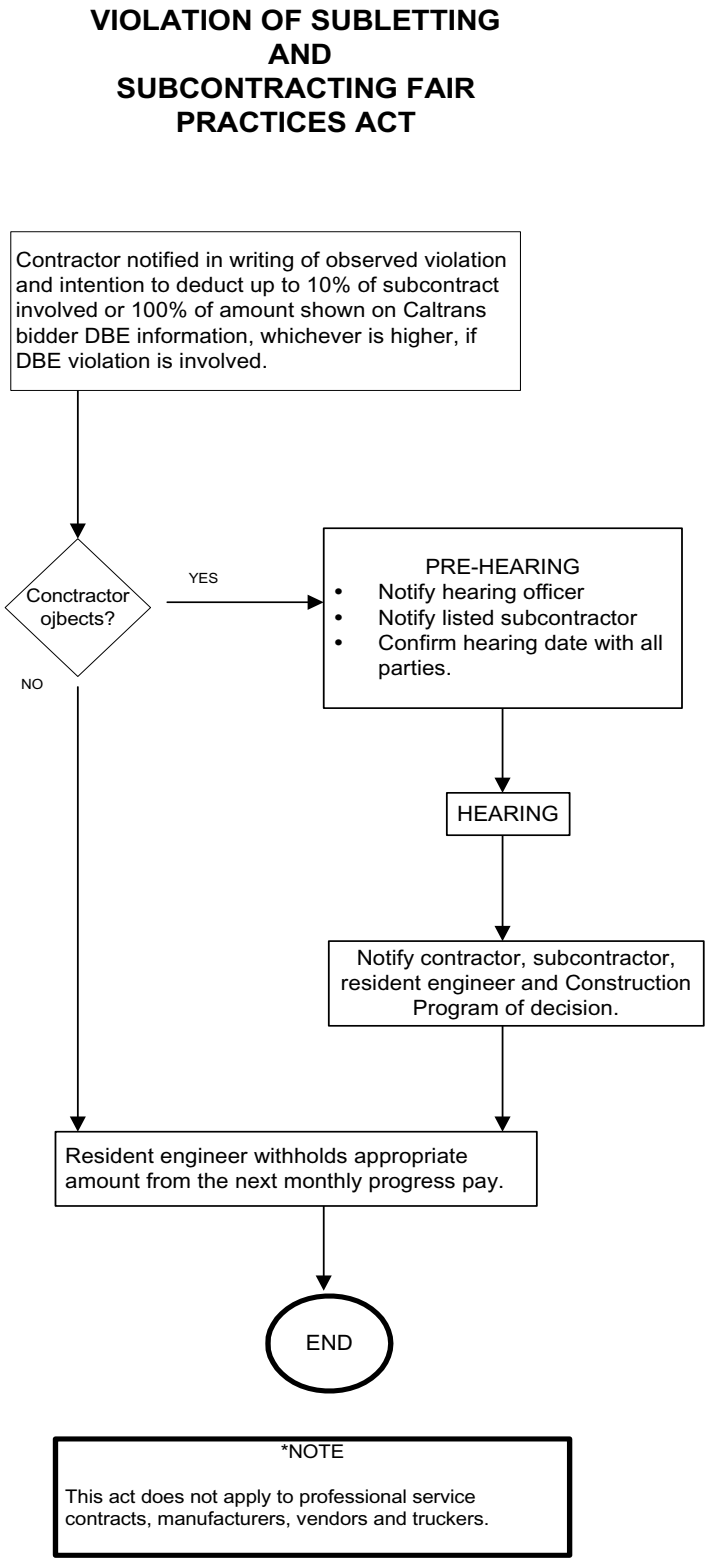
> "It has come to our attention that you are in apparent violation of the Subletting and Subcontracting Fair Practices Act, Public Contract Code, Sections 4100 through 4114, for work being performed on item(s) ____ of State Contract No. ------.
>
> "You will be assessed a penalty of $ _____ as provided in the Subletting and Subcontracting Fair Practices Act. If you wish to dispute this penalty, you should request a hearing. Caltrans will schedule a hearing on this apparent violation and the penalty to be assessed. Should you request a hearing, you will be given five days notice of the time and place thereof, in accordance with Section 4110 of the Public Contract Code. If you do not request a hearing, the penalty will be assessed as a permanent deduction on the next progress pay estimate."

Send copies of the letter to the subcontractor and to the Division of Construction.

- If the contractor requests, the district will schedule a hearing using the same procedure as described in the substitution process.
- When Caltrans has determined that a penalty will be imposed (0 to 10 percent of the subcontract amount depending on the district's evaluation of the reasons for the violation of the act), the district must ensure that the penalty amount is deducted from a future estimate.
- Occasionally, the contractor will list subcontractors that are not required by the act. If so, only Caltrans' normal subcontracting procedures apply.

The following flowchart shows the steps to take when the contractor is found to be in violation of the Subletting and Subcontracting Fair Practices Act.

Table 3-8.2 Violation of Subletting and Subcontracting Fair Practices Act Flowchart



3-801D Procedure for Approval or Acknowledgment of Subcontractors

The resident engineer has the responsibility for approving subcontractors on federally funded projects or acknowledging subcontractors on state-financed projects.

In general, approving or acknowledging subcontractors is necessary only for first-tier subcontractors.

To request subcontracting, the contractor must submit Form CEM-1201, "Subcontracting Request," to the resident engineer. When the contract was awarded, the contractor received a blank Form CEM-1201, along with other documents. The resident engineer should provide to the contractor additional blank forms when necessary. The back of the form contains instructions for completing the form.

Upon receipt of Form CEM-1201, the resident engineer will complete the lower portion of the form. Before approving the contractor's request, the resident engineer must do the following:

- Check the contractor's portion of the form.
- Complete lines 1 through 9. Lines 2 and 6 will contain running balances, so process requests in order of request number. Complete the remainder of the form as outlined on the form.
- Verify subcontractors comply with DBE goals submitted by the contractor before the contract award. Ensure no conflict exists between the DBE requirements and the listing requirements of the Subletting and Subcontracting Fair Practices Act.
- If the contractor's request meets all the requirements, sign and date the form and distribute it as indicated on the form.

The special provisions for most contracts considered non-highway related (building contracts) waive the requirements of Section 8-1.01, "Subcontracting," of the *Standard Specifications*. The effect of this waiver is that a subcontractor who is listed in the bid proposal may perform the work without advance notification to the resident engineer, and the requirements about the prime contractor performing 50 percent of the work are not applicable. However, those contracts that contain federal funding still require that subcontractors receive prior approval and that prime contractors perform a specified percentage of the work. Such federally funded contracts must be processed as discussed above.

3-802 Beginning of Work

3-802 Beginning of Work

This section covers the subject of when the contractor begins work. This subject is not to be confused with the beginning of contract time and the preparation of Form CEM-2701, "Weekly Statement of Working Days," which is covered below in Section 3-805, "Time of Completion."

The contract normally requires the contractor to begin work on a project within 15 calendar days after receiving notice that the contract has been approved. The special provisions may modify the 15-day requirement.

The resident engineer must determine when to record the beginning of work, based on judgment and experience. For example, setting up signs could be the only work under way. If conversations with the contractor indicate movement toward pursuing the work, the setting up of signs is sufficient to indicate the beginning of work. Record the date the contractor begins work on Form CEM-2701 in the resident

engineer's daily report, and on the original or supplemental Form CEM-6003, "Progress Pay Estimate, Project Initiation or Update." For more information, see Section 5-103B (1), "Completing Form CEM-6003, Project Pay-Estimate Project Initiation or Update," of this manual.

Adequately record the district's actions toward encouraging the contractor to begin work. Notes of discussions from the preconstruction conference or other conversations with the contractor provide the necessary records. If a contractor fails to begin work by the specified time, remind the contractor of this failure under "Remarks" on Form CEM-2701. Send a separate letter with an additional reminder.

When the district decides that failure to begin work will result in unsatisfactory progress, discuss the situation with the construction field coordinator.

3-802A Work Before Contract Approval

After the contractor has executed and returned the contract to Caltrans, the contractor, after submitting the specified notice, may enter the site and begin operations.

When a contractor wants to start work before contract approval, call the Office of Office Engineer, contract documents unit, to determine whether Caltrans has received the executed contract documents. If the office has received the documents, proceed as set forth in Section 8-1.03, "Beginning of Work," of the *Standard Specifications*.

If a contractor wants to begin work before contract documents have been delivered to Caltrans, the contractor must obtain an encroachment permit from the district. The permit must incorporate the same terms stated in Section 8-1.03 that apply after the contractor has returned the executed contract documents to Caltrans but before the time of the contract's approval. In addition the permit must include the following:

- A statement that the contractor is responsible and liable for any personal injury or property damage resulting from the work.
- The requirements for cooperation contained in the special provisions and in Section 7-1.14, "Cooperation," of the *Standard Specifications*. The terms of the permit should include notice that the contractor may be working on the site concurrently with others performing utility relocation, right-of-way clearance work, or other construction operations and that the work of the others will take precedence over the contractor's operations.
- When obvious conflicts are apparent, a permit should not be issued.
- The limits of the area in which work will be performed.
- The operation or operations to be performed.
- A statement that the contractor will comply with the requirements of the contract plans, *Standard Specifications,* and the project's special provisions and that the contractor will comply with any order of work specified in these documents.
- A statement that the contractor's operations will not deprive property owners of access.
- A requirement to provide an adequate bond (or cash deposit) to cover the work contemplated before starting any work. The amount should be the same as for other types of work, as covered in the *Manual for Encroachment Permits on California State Highways*.
- A reference to the contract's water pollution control requirements.

When extra work must be a first order of work, it should be performed under a "prior authorization," as covered in Section 5-3, "Contract Change Orders," of this manual. After the executed contract documents have been delivered as specified, contract change orders may be approved in the normal manner.

The district must not process requests for relief from maintenance or for contract acceptance until after the contract's approval.

3-803 Progress Schedule

3-803 Progress Schedule

When the special provisions require a progress schedule, the resident engineer must make every effort to obtain a reasonable schedule at the beginning of the contract. Any communication regarding the progress schedule must be recorded in the daily report. Notify the contractor in advance if a progress payment will be withheld for failure to submit a satisfactory schedule.

Any schedule that does the following will meet the specification requirements:

- Separates the major items into activities that are likely to become the controlling operation or operations.
- Can be used by the contractor and resident engineer to monitor and evaluate progress, determine controlling items of work, and analyze time impacts from contract changes or work delays.
- Is consistent with contract time requirements.
- Displays milestones such as placing traffic on detours or new pavement and beginning new phases of the work in staged construction.

The resident engineer must require an updated or revised progress schedule regularly or when significant changes occur in the project.

The special provisions may require a progress schedule using the critical path method (CPM). The special provisions will contain all the requirements for such a schedule. For CPM information and guidelines, refer to the *Construction Scheduling Manual* published by the Division of Construction.

3-804 Temporary Suspension of Work

3-804 Temporary Suspension of Work

Temporary suspension of work, as covered under Section 8-1.05, "Temporary Suspension of Work," of the *Standard Specifications*, falls into two general categories:

1. This category relates to the contractor's failure to carry out orders or to perform any provision of the contract. Any letter ordering such a suspension must include references to applicable sections of the specifications and, if possible, state the conditions under which work may be resumed. Such action is taken only after careful consideration of all aspects of the problem.
2. This category relates to unsuitable weather or conditions unfavorable for the suitable prosecution of the work. This type of suspension may result from anticipated heavy traffic due to a holiday or a special event.

   a. Suspension of an Item or Operation

      A suspension that affects an item or several items may be ordered. Usually this suspension is used when either the work or the public will be affected adversely by continued operation.

Although this type of suspension is an option available only to the engineer, consider the contractor's opinion on such a suspension.

b. Suspension of the Entire Project

In areas subject to severe weather, it is permissible to suspend an entire project if this action is considered to be in the best interest of Caltrans. However, the engineer's authority to suspend is limited to the reasons stated in Section 8-1.05, "Temporary Suspension of Work," of the *Standard Specifications*. When an entire project is suspended for reasons that do not fall under the scope of Section 8-1.05, the suspension must have the contractor's concurrence.

During any suspension, advise the contractor of the conditions under which maintenance will be performed.

During a suspension, preferably use the contractor to perform the necessary work to provide for public convenience or public safety. If Caltrans must perform such work, the district will request a director's order, financed from the contract allotment. This order allows the district to hire a contractor to perform the work at force account.

When the reason for a suspension no longer exists, or when favorable conditions are expected soon for resuming work, the resident engineer must notify the contractor in writing. The letter must state the date when working days are expected to be resumed and must allow sufficient time to permit the contractor to remobilize the necessary labor and equipment. Generally speaking, 10 working days are considered a reasonable time.

The district construction office must forward to the Division of Construction copies of the letters notifying the contractor of suspension and resumption of work.

Because of an ordered suspension of work, the contractor may be due additional compensation, contract time, or both, that was not provided for elsewhere in the specifications. The specification allowing such compensation applies only to situations where the work is suspended for an unreasonable period. A one-day suspension because of traffic generated by a planned major event is not unreasonable. However, a suspension resulting from an unplanned major incident could be reason for granting additional compensation, time, or both.

3-805 Time of Completion

This section discusses the method of tracking contract time and uses the terms "days," "working days," and "controlling operation." Section 1, "Definitions and Terms," of the *Standard Specifications*, defines "days." Section 8-1.06, "Time of Completion," of the *Standard Specifications*, defines "working days" and "controlling operation." However, the contract's special provisions may modify the definition of working days.

The total time allowed for completion of a contract is a specified number of working days. The "computed date for completion" of a contract is the date of the last working day. On most projects situations arise that extend the date for completion beyond the "computed date for completion." This extension is called the "extended date for completion."

3-805 Time of Completion

The “computed date for completion” can be extended in two ways:

1. A day that normally would be charged as a working day is not charged. The number of working days remains the same. The result of this situation is that the “computed date for completion” is extended by one working day. This method of extending the date for completion is used when work is suspended or when working days are not charged for the reasons given in paragraphs (b) and (c) in Section 8-1.06, “Time of Completion,” of the *Standard Specifications*.

2. The number of working days in the contract is increased, resulting in an extension of the date for completion. However, the actual working day, or days, on which an event occurred that resulted in an extension of time are charged as working days. This method of extending the date for completion is called a time extension. Reasons for time extensions are specified in Section 8-1.07, “Liquidated Damages,” Section 8-1.09, “Right of Way Delays,” and Section 8-1.10, “Utility and Non-Highway Facilities,” of the *Standard Specifications*.

3-805A Weekly Statement of Working Days

The resident engineer must use Form CEM-2701, “Weekly Statement of Working Days,” to report the status of contract time to the contractor.

As soon as possible and no later than the middle of the following week, forward the original statement to the contractor. For review, send one copy to the district construction office, and file another copy with the project records. When working days are not being charged because of a work suspension, the weekly statement need not be submitted until working days are charged again. The first weekly statement after resumption of work will show the total suspension days to date.

Form CEM-2701 consists of three basic sections:

3-805A (1) The Record Section (Upper Block)

This section is used to record all working days, nonworking days as defined in Section 8-1.06, “Time of Completion,” of the *Standard Specifications*, and working days on which no productive work was performed on the controlling operation. In this section, tabulate every elapsed working and nonworking day during the life of the project.

Each day, the resident engineer must determine whether or not to charge a working day, and if necessary, discuss the decision with the contractor. The “current controlling operation” is the basis of this determination; therefore, the resident engineer must base the decision on conditions effective on the day under consideration. The resident engineer will note on Form CEM-2701 the operation that, in the resident engineer’s opinion, is currently controlling. If the contractor does not concur, the entry will give the contractor an opportunity to protest formally, in accordance with Section 8-1.06, “Time of Completion,” of the *Standard Specifications*.

If the controlling operation is a nonweather dependent activity, such as concrete curing or an embankment settlement period, a working day must be charged during inclement weather.

When determining nonworking days, loss of time due to inclement weather may extend beyond the period of actual inclement weather. The following list provides examples of this type of situation:

- Although the weather may be suitable, the grade may still be too wet to work because of previous days of inclement weather.
- If, due to unstable material, the contractor spent the major portion of the day rebuilding haul roads and removing saturated material from the tops of fills, no progress toward completion would have been made even though the full crew might have worked the entire day.

Inclement weather can be other than wet or cold weather. For instance, it may be too hot to produce concrete that meets specified temperatures. If all specified precautions have been complied with and the concrete work is the controlling operation, a weather nonworking day could be granted.

If a nonworking day is granted because of requirements in Section 10, "Maintaining Traffic" of the special provisions, state the reason in the "Remarks" section of Form CEM-2701.

A temporary short-term suspension, for reasons such as anticipated heavy traffic for an event or holiday, must be noted in the "Weather, Weather Conditions or Other Conditions" section and explained in the "Remarks" section. Do not show any charges for working or nonworking days. Include the suspension day in the "Days contract suspended" line under the heading "Computation of Extended Date for Completion" on Form CEM-2701.

In the column titled "Working Days No Work Done on Controlling Operation," record any working day on which no work is done on the project or on the controlling operations. If the resident engineer knows the reasons for lack of work, the resident engineer should note them in the daily report.

3-805A (2) Time Extensions (the Center Block)

This section is used for recording extensions of time for causes specifically set forth in Section 8-1.07, "Liquidated Damages," Section 8-1.09, "Right of Way Delays," and Section 8-1.10, "Utility and Non-Highway Facilities," of the *Standard Specifications* or for applicable requirements in the special provisions.

Analyze possible time extensions while the circumstances are still fresh in the minds of the principals.

In the "CCO" column, record working days granted for contract change orders. In the "Other" column, record all other time extensions covered by the above mentioned sections not included in contract change orders.

Use the following procedure for approving an "other day":

- Under "Remarks," the resident engineer will acknowledge the receipt of a letter from the contractor requesting a time extension.
- The resident engineer will forward the contractor's letter to the construction engineer with a cover letter containing the following information:
    1. Number of days requested and the contractor's justification for the request.
    2. Cause of delay.

3. Statement describing what controlling operation or operations are delayed and to what extent.
4. Resident engineer's recommendation.
5. Reference to supporting data.
6. On federal oversight projects, comments from the area engineer of the Federal Highway Administration.

- The construction engineer or appropriate approving engineer (depending on district policy), will note approval, if appropriate, on the resident engineer's letter and return a copy to the resident engineer or notify the resident engineer of other steps to be taken.
- If the time extension is approved, the resident engineer will enter it on Form CEM-2701, "Weekly Statement of Working Days," as an approved extension, with a statement under "Remarks" similar to that shown on Example 3-8.4, at the end of this section.

The Division of Construction must approve "other days" granted after the completion of the final weekly statement of working days.

If contract time has expired, the engineer may consider time extensions for causes described in the fifth paragraph of Section 8-1.07, "Liquidated Damages," of the *Standard Specification* and in Section 8-1.09, "Right of Way Delays," and Section 8-1.10, "Utility and Non-Highway Facilities," of the *Standard Specifications* the director must approve all other time extensions for causes occurring after the contract working days have expired.

In considering time extensions for any of the specific causes designated in the contract, deduct all nonworking days within the extension period, and ensure the extension is made only for the working days charged to the contract during the extension. For additional information on time extensions after contract completion, see "Liquidated Damages" later in this section.

3-805A (3) Computation of Extended Date for Completion (the Lower Block)

In the lower section of the form, summarize the information the contractor will receive.

The "first working day" is the calendar day specified in Section 4, "Beginning of Work, Time of Completion and Liquidated Damages," of the contract's special provisions. This day is usually the 15th calendar day after contract approval.

Several methods are used to specify the first working day. The resident engineer must read and understand the contract's specifications and correctly record the date of the first working day.

Use the Caltrans Working Day Calendar to determine the correct values to place in the "Numbered Day" column on Form CEM-2701 for the first working day, the computed date for completion, and the extended date for completion. The calendar is available at the following address:

http://www.dot.ca.gov/hq/construc/calendar.html

The number shown on the calendar on a particular date is that date's numbered day.

3-805A (4) Final Weekly Statement of Working Days

Designate the Form CEM-2701 that is used for the week during which a contract is accepted as the "Final Weekly Statement of Working Days." Prepare this statement on the day the district accepts the contract and ensure the statement reflects the "approved status of time" on this date. As soon as the district construction office receives the form from the field, the office must forward a copy of the final statement to the Division of Construction. For revising the status of time from that shown on the final weekly statement of working days, see Section 3-806, "Liquidated Damages" later in this section.

3-805A (5) Examples

The following examples show typical entries for Form CEM-2701, "Weekly Statement of Working Days."

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

(JOB STAMP)

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 1

CONTRACTOR

WEEK ENDING (*month, day, year*) 04/09/99

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
4/5/99	Monday				
4/6/99	Tuesday	First working day - clear	1		1
4/7/99	Wednesday	Clear	1		1
4/8/99	Thursday	Contractor began work - clear	1		
4/9/99	Friday	Clear	1		
Days this week			4		2
Days previously reported					
Total days to date			4		2

Time Extensions[3]	CCO Numbers[4]	Days Approved CCO	Days Approved Other
Days this report			
Days previously reported			
Total days to date			

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		528	4/6/99
2. Working days specified in contract	140		
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		667	10/25/99
4. Days contract suspended to date	0		
5. Total time extension days approved to date *(CCO plus other)*	0		
6. Total Nonworking days to date[6]	0		
7. Subtotal **(line 4 + line 5 + line 6)**	0		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		667	10/25/99
9. Revised working days for contract **(line 2 + line 5)**	140		
10. Total working days to date	4		
11. WORKING DAYS REMAINING **(line 9 - line 10)**	136		

CONTROLLING OPERATIONS (S)

Construction area signs

REMARKS

Contract approved March 22th, 1999

(Refer to Section 4 of the special provisions to determine the first day of work)

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.

NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE

DATE

Distribution: Original--contractor, copies--district, resident engineer

Example 3-8.2 Begin Work Before First Working Day

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION *(JOB STAMP)*

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 1

CONTRACTOR

WEEK ENDING (*month, day, year*) 04/09/99

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
4/5/99	Monday	Clear - Contractor began work			
4/6/99	Tuesday	First working day - clear	1		
4/7/99	Wednesday	Clear	1		
4/8/99	Thursday	Clear	1		
4/9/99	Friday	Clear	1		
Days this week			4		
Days previously reported					
Total days to date			4		

Time Extensions[3]	CCO Numbers[4]	Days Approved	
		CCO	Other
Days this report			
Days previously reported			
Total days to date			

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		528	4/6/99
2. Working days specified in contract	140		
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		667	10/25/99
4. Days contract suspended to date	0		
5. Total time extension days approved to date *(CCO plus other)*	0		
6. Total Nonworking days to date[6]	0		
7. Subtotal **(line 4 + line 5 + line 6)**	0		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		667	10/25/99
9. Revised working days for contract **(line 2 + line 5)**	140		
10. Total working days to date	4		
11. WORKING DAYS REMAINING **(line 9 - line 10)**	136		

CONTROLLING OPERATIONS (S)

Construction area signs

REMARKS

Contract approved March 22th, 1999

(Refer to Section 4 of the special provisions to determine the first day of work)

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.

NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE | DATE

Distribution: Original--contractor, copies--district, resident engineer

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION *(JOB STAMP)*

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 5

CONTRACTOR

WEEK ENDING (*month, day, year*) 05/07/99

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
05/03/99	Monday	Cloudy	1		1
05/04/99	Tuesday	Rain		1	
05/05/99	Wednesday	Clear - embankment too wet		1	
05/06/99	Thursday	Clear	1		
05/07/99	Friday	Clear	1		
Days this week			3	2	1
Days previously reported			16	3	4
Total days to date			19	5	5

Time Extensions[3]	CCO Numbers[4]	Days Approved CCO	Days Approved Other
Days this report	CCO #2	2	
Days previously reported			
Total days to date		2	

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		528	4/6/99
2. Working days specified in contract	140		
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		667	10/25/99
4. Days contract suspended to date	0		
5. Total time extension days approved to date *(CCO plus other)*	2		
6. Total Nonworking days to date[6]	5		
7. Subtotal **(line 4 + line 5 + line 6)**	7		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		674	11/3/99
9. Revised working days for contract **(line 2 + line 5)**	142		
10. Total working days to date	19		
11. WORKING DAYS REMAINING **(line 9 - line 10)**	123		

CONTROLLING OPERATIONS (S)

Embankment Construction

REMARKS

April 21st and 22nd 1999 granted for CCO #2

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.
NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE | DATE

Distribution: Original--contractor, copies--district, resident engineer

Example 3-8.4 Approval of a Time Extension

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION *(JOB STAMP)*

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 10

CONTRACTOR

WEEK ENDING (*month, day, year*) 06/11/99

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
6/7/99	Monday	Clear	1		
6/8/99	Tuesday	Clear	1		
6/9/99	Wednesday	Cloudy	1		
6/10/99	Thursday	Clear	1		
6/11/99	Friday	Clear	1		
Days this week			5		
Days previously reported			38	5	5
Total days to date			43	5	5

Time Extensions[3]	CCO Numbers[4]	Days Approved CCO	Days Approved Other
Days this report			2
Days previously reported		2	
Total days to date		2	2

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		528	4/6//99
2. Working days specified in contract	140		
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		667	10/25/99
4. Days contract suspended to date	0		
5. Total time extension days approved to date *(CCO plus other)*	4		
6. Total Nonworking days to date[6]	5		
7. Subtotal **(line 4 + line 5 + line 6)**	9		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		676	11/5/99
9. Revised working days for contract **(line 2 + line 5)**	144		
10. Total working days to date	43		
11. WORKING DAYS REMAINING **(line 9 - line 10)**	101		

CONTROLLING OPERATIONS (S)

Settlement periods for bridge abutment fills

REMARKS

A review of our records indicates that the controlling operation of embankment construction was delayed by a labor dispute on May 6-7, 1999. In accordance with Section 8-1.07 of the Standard specifications and your letter dated June 3, 1999, two days are granted

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.
NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE | DATE

Distribution: Original--contractor, copies--district, resident engineer

Example 3-8.5 Non-working Day Due to "Maintaining Traffic" and Suspension

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION *(JOB STAMP)*

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 13

CONTRACTOR

WEEK ENDING (*month, day, year*) 07/02/99

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
6/28/99	Monday	Clear	1		
6/29/99	Tuesday	Clear	1		
6/30/99	Wednesday	Clear	1		
7/1/99	Thursday	Clear - Suspension			
7/2/99	Friday	Clear - Traffic nonworking day		1	
Days this week			3	1	
Days previously reported			53	5	5
Total days to date			56	6	5

Time Extensions[3]	CCO Numbers[4]	Days Approved	
		CCO	Other
Days this report			
Days previously reported		2	2
Total days to date		2	2

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		528	4/6/99
2. Working days specified in contract	140		
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		667	10/25/99
4. Days contract suspended to date	1		
5. Total time extension days approved to date *(CCO plus other)*	4		
6. Total Nonworking days to date[6]	6		
7. Subtotal **(line 4 + line 5 + line 6)**	11		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		678	11/9/99
9. Revised working days for contract **(line 2 + line 5)**	144		
10. Total working days to date	56		
11. WORKING DAYS REMAINING **(line 9 - line 10)**	88		

CONTROLLING OPERATIONS (S)

Paving Main Street connector.

REMARKS

Work was suspended on July 1st in accordance with Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications due to city holiday weekend preparations.

Section 10-1.14, "Maintaining Traffic," of the special provisions prohibits work on Friday, Saturday, and Sunday when a designated legal holiday falls on Monday'. See Section 8-1.06 of the Standard Specifications

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.

NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE | DATE

Distribution: Original--contractor, copies--district, resident engineer

Example 3-8.6 Type 2 Plant Establishment. Highway work not yet complete

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION *(JOB STAMP)*

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 83

CONTRACTOR

WEEK ENDING (*month, day, year*) 3/5/99

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
10/4/99	Monday	Partly cloudy	1		
10/5/99	Tuesday	clear	1		
10/6/99	Wednesday	Clear	1		
10/7/99	Thursday	Clear	1		
10/8/99	Friday	cloudy	1		
Days this week			5	0	0
Days previously reported			382	16	23
Total days to date			387	16	23

Time Extensions[3]	CCO Numbers[4]	Days Approved CCO	Days Approved Other
Days this report			
Days previously reported	#16, #21	14	2
Total days to date		14	2

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		255	3/2/98
2. Working days specified in contract	400		
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		654	10/5/99
4. Days contract suspended to date			
5. Total time extension days approved to date *(CCO plus other)*	16		
6. Total Nonworking days to date[6]	16		
7. Subtotal **(line 4 + line 5 + line 6)**	32		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		686	11/22/99
9. Revised working days for contract **(line 2 + line 5)**	416		
10. Total working days to date	387		
11. WORKING DAYS REMAINING **(line 9 - line 10)**	29		

CONTROLLING OPERATIONS (S) Striping and signs

REMARKS

Status of plant establishment and working days

1. Plant establishment period started 9/23/99
2. There are 250 plant establishment days in this contract 250
3. Working days previously credited 7
4. Working days credited this week 5
5. Total plant establishment days credited to date 12
6. Plant establishment days remaining 238

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.
NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE | DATE

Distribution: Original--contractor, copies--district, resident engineer

Example 3-8.7 Type 2 Plant Establishment. Non-plant establishment work completed

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION *(JOB STAMP)*

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 92

CONTRACTOR

WEEK ENDING (*month, day, year*) 12/10/99

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
12/6/99	Monday	Clear	1		
12/7/99	Tuesday	Partly cloudy	1		
12/8/99	Wednesday	Partly cloudy Relief of maint. For all non-P.E. work	1		
12/9/99	Thursday	Rain	1		
12/10/99	Friday	rain	1		
Days this week			5		
Days previously reported			424	16	23
Total days to date			429	16	23

Time Extensions[3]	CCO Numbers[4]	Days Approved CCO	Days Approved Other
Days this report			
Days previously reported	16, 21	14	2
Total days to date		14	2

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		255	3/2/98
2. Working days specified in contract	650		
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		904	10/2//00
4. Days contract suspended to date			
5. Total time extension days approved to date *(CCO plus other)*	16		
6. Total Nonworking days to date[6]	16		
7. Subtotal **(line 4 + line 5 + line 6)**	32		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		936	11/17/00
9. Revised working days for contract **(line 2 + line 5)**	666		
10. Total working days to date	429		
11. WORKING DAYS REMAINING **(line 9 - line 10)**	237		

CONTROLLING OPERATIONS (S)

Plant establishment

REMARKS

Relief of maintenance for all non-plant establishment work on 12/8/99. 21 calendar days overrun in contract time for non-plant establishment work.

Status of plant establishment

1.	250 day Plant establishment period started	9/23/99
2.	working days previously credited	49
3.	working days credited this week	5
4.	Total plant establishment days credited to date	54
5.	Plant establishment days remaining	196

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.
NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE | DATE

Distribution: Original--contractor, copies--district, resident engineer

Example 3-8.8 Final Weekly Statement of Working Days

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION *(JOB STAMP)*

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 34

CONTRACTOR

WEEK ENDING (*month, day, year*) 5/26/00

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
5/15/00	Monday	Clear	1		
5/16/00	Tuesday	Clear	1		
5/17/00	Wednesday	Clear - contract accepted	1		
5/18/00	Thursday				
5/19/00	Friday				
Days this week			3		
Days previously reported			152	26	10
Total days to date			155	26	10

Time Extensions[3]	CCO Numbers[4]	Days Approved CCO	Days Approved Other
Days this report			
Days previously reported		18	2
Total days to date		18	2

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		528	4/6/99
2. Working days specified in contract	140		
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		667	10/25/99
4. Days contract suspended to date	101		
5. Total time extension days approved to date *(CCO plus other)*	20		
6. Total Nonworking days to date[6]	26		
7. Subtotal **(line 4 + line 5 + line 6)**	147		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		814	5/24/00
9. Revised working days for contract **(line 2 + line 5)**	160		
10. Total working days to date	155		
11. WORKING DAYS REMAINING **(line 9 - line 10)**			

CONTROLLING OPERATIONS (S)

Final clean up and punch list

REMARKS

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.
NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE | DATE

Distribution: Original--contractor, copies--district, resident engineer

Example 3-8.9 Contract in Overrun

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION *(JOB STAMP)*

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 80

CONTRACTOR

WEEK ENDING (*month, day, year*) 02/12/99

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
2/8/99	Monday	Clear	1*		
2/9/99	Tuesday	Clear	1*		
2/10/99	Wednesday	Cloudy	1*		
2/11/99	Thursday	Rain	1*		
2/12/99	Friday	Holiday	1*		
Days this week					
Days previously reported			314	59	27
Total days to date			314	59	27

Time Extensions[3]	CCO Numbers[4]	Days Approved CCO	Days Approved Other
Days this report			
Days previously reported		14	
Total days to date		14	

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		115	8/5/97
2. Working days specified in contract			
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		414	10/16/98
4. Days contract suspended to date			
5. Total time extension days approved to date *(CCO plus other)*	14		
6. Total Nonworking days to date[6]	59		
7. Subtotal **(line 4 + line 5 + line 6)**	73		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		487	2/3/99
9. Revised working days for contract **(line 2 + line 5)**	314		
10. Total working days to date	314		
11. WORKING DAYS REMAINING **(line 9 - line 10)**			

CONTROLLING OPERATIONS (S)

Functional tests

REMARKS

*WORKING and NON-WORKING Days are shown for record only since the contract time has elapsed. There is a total of 9 calendar days overrun through February 12, 1999.

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.
NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE | DATE

Distribution: Original--contractor, copies--district, resident engineer

Example 3-8.10 Calendar Day Project

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION *(JOB STAMP)*

WEEKLY STATEMENT OF WORKING DAYS

CEM-2701 (REV. 2/2001)

REPORT NUMBER 7

CONTRACTOR

WEEK ENDING (*month, day, year*) 03/04/01

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
2/26/01	Monday	Clear	1		
2/27/01	Tuesday	Suspended			
2/28/01	Wednesday	Cloudy	1		
3/01/01	Thursday	Rain		1	
3/02/01	Friday	Wet Grade, no work		1	
3/03/01	Saturday	Partly cloudy	1		
3/04/01	Sunday	Clear	1		
Days this week			4	2	
Days previously reported			36	11	
Total days to date			40	13	

Time Extensions[3]	CCO Numbers[4]	Days Approved CCO	Days Approved Other
Days this report	#8	4	
Days previously reported		3	
Total days to date		7	

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day		N/A	1/10/01
2. Working days specified in contract	80		
3. COMPUTED DATE FOR COMPLETION **(line 1 + line 2 - 1)**		N/A	3/30/01
4. Days contract suspended to date	1		
5. Total time extension days approved to date *(CCO plus other)*	7		
6. Total Nonworking days to date[6]	13		
7. Subtotal **(line 4 + line 5 + line 6)**	21		
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**		N/A	4/20/01
9. Revised working days for contract **(line 2 + line 5)**	87		
10. Total working days to date	40		
11. WORKING DAYS REMAINING **(line 9 - line 10)**	47		

CONTROLLING OPERATIONS (S)

Earthwork

REMARKS

Contract Change Order #8 approved 3/02/01

Contract work suspended 2/27/01 because of anticipated heavy traffic due to the annual Snow Maiden Festival.

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.

NOTE: *Footnote instruction for resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE | DATE

Distribution: Original--contractor, copies--district, resident engineer

3-805B Progress of Work

After each progress estimate, update Form CEM-2601, "Construction Progress Chart." The Contract Administration System (CAS) uses the formula contained on this form to determine progress. For a description of this process, see Section 5-1, "Project Records and Reports," of this manual.

The contractor's progress is usually considered unsatisfactory when the contractor's progress curve falls below the curve of the contract progress chart or when successive points on the contractor's progress curve indicate the contractor's progress rate will soon fall below the curve.

Whenever the contractor fails to prosecute the work adequately, as evidenced by the plot of actual progress and the resident engineer's concurrence, the resident engineer must notify the contractor of the apparent lack of progress. If the resident engineer judges that the work on the original schedule will not be completed by the original due date, the resident engineer must request the contractor to submit a revised schedule showing how the balance of the work will be carried out.

Whenever the district believes the contractor's bonding company should be notified of unsatisfactory progress, advise the Division of Construction of the reasons supporting such an action. If appropriate, the Division of Construction will initiate the notification.

If the district believes the lack of progress on a contract justifies a meeting, request the Division of Construction to arrange a conference to be attended by the contractor's representatives, the bonding company, and Caltrans. If appropriate, the Division of Construction will arrange the conference. For more information, refer to "Termination of Control" in this section.

3-806 Liquidated Damages

3-806 Liquidated Damages

Section 8-1.07, "Liquidated Damages," of the *Standard Specifications* covers various items such as director's days, time extensions, and shortage of materials. Liquidated damages is defined in Section 1, "Definitions and Terms," of the *Standard Specifications* and is also referenced in Section 4, "Beginning of Work, Time of Completion, and Liquidated Damages," of the special provisions.

3-806A Overrun in Contract Time

If the "Extended Date for Completion" on the final "Weekly Statement of Working Days" contains a date before the date of the contract's completion, an apparent overrun has occurred. Proceed as follows:

3-806A (1) Case 1

The district intends to assess liquidated damages for the overrun shown on the final "Weekly Statement of Working Days." Enter the deduction for liquidated damages into the project records, and proceed with the proposed final estimate.

3-806A (2) Case 2

The district intends to change the status of time from that shown on the final "Weekly Statement of Working Days" by time due on contract change orders. Time extensions resulting from contract change orders should have been resolved before the contract's completion in accordance with instructions covered elsewhere in this manual. For those instances where extenuating circumstances result in unresolved time for contract change orders after completion, complete all deferred-time contract change orders, enter the data into the project records, enter any remaining deductions for liquidated damages into the records; and proceed with the proposed final estimate.

3-806A (3) *Case 3*

The district intends to change the status of time from that shown on the final "Weekly Statement of Working Days" as a result of "other day" time extensions still under consideration on the date of the contract's acceptance. Obtain concurrence for making such changes from the Division of Construction. Report the recommended disposition of each item of unresolved time in a form sufficiently clear and complete that no interpretation or further explanation is needed. Upon receipt of the recommendations, the Division of Construction will advise the district of what action to take.

Include a status of contract time in a form similar to the following:

	Calendar Date	Working Days or Numbered Day
Date attorney general approved contract	7-05-00	842
First working day	7-20-00	853
Working days specified in contract		140
Computed date for completion	2-13-01	993
Total time extensions, contract change order, final Form CEM-2701		5
Total time extensions, other, final Form CEM-2701		15
Nonworking days, final Form CEM-2701		45
Additional contract change order days (if applicable)		14
Additional time extensions recommended (if applicable)		10
Extended date for completion	6-20-01	982
Date contract completed	6-20-01	882
Remaining overrun		0

After the disposition of overruns has been determined, the district will advise the contractor directly.

Place copies of all memoranda in the project files to serve as the record of final disposition of overruns.

For any unresolved overrun in time, show a deduction to assess liquidated damages on the proposed final estimate. If the contractor objects to this assessment, follow the claim procedures outlined in Section 5-4, "Disputes," of this manual.

3-806A (4) Case 4

When the final quantities of individual contract items have exceeded 125 percent of the engineer's estimate, not as a result of ordered changes, the district may recommend the director's approval of a commensurate time extension. Such a recommendation is subject to *all* of the following provisions:

- Time is allowable only to the extent that each item was considered to be controlling.
- Any time extension is applicable only to the excess above 125 percent of the engineer's estimate.
- The maximum allowable time extension for each item cannot exceed the amount of time determined by applying normal production rates to the increased quantity of the item involved.

Time extensions for reasons other than those specifically enumerated in the contract are made at the discretion of the director and are to be deferred until completion of the contract. When the director grants additional days at this stage, these days are referred to as "director days." Forward requests for director days to the Division of Construction together with the district's recommendation and reasons. The request should contain sufficient information and justification to allow the construction field coordinator to complete Form CEM-2702, "Overrun in Contract Time." Director days are approved by the Division of Construction chief. Do not record these director days on the "Weekly Statement of Working Days."

3-806B Shortage of Material

Section 8-1.07, "Liquidated Damages," of the *Standard Specifications* strictly defines and limits a shortage of materials for which a time extension may be granted. Before a time extension may be granted, several determinations must be made:

- Determine whether a timely notice of delay exists.

  The contractor's notice of delay, whether a protest of a "Weekly Statement of Working Days" or a separate letter, must be received no later than 15 days after the material shortage first caused the work delay.

- Determine the effect on the controlling item of work.

  If the delay does not affect the controlling item of work, advise the contractor (in writing) accordingly. If the contractor requests to be allowed to substitute the unavailable material with available material, the resident engineer must seek assistance from those responsible for the design. Contract change orders are to be processed as contractor-requested changes.

- Determine whether the materials, articles, parts, or equipment are standard items.

  Standard items are produced to meet the specifications of industry-wide organizations such as the American Association of State Highway and Transportation Officials (AASHTO), the American Society for Testing and Materials (ASTM), the American Wood-Preservers' Association, the American Institute of Steel Construction (AISC), and the United States Department of Agriculture (USDA), among others. The fact that Caltran's specifications refer to these standards does not alter the item's status.

Standard items include those that are listed in a catalog and are available for immediate delivery and also items that are normally shelf items available for purchase at supply houses. Items that are manufactured only upon order are not standard items even if included in a catalog.

Examples of materials that are usually considered standard items are the following:

1. Commercial fertilizer (industry specification)
2. Soil amendment (industry specification)
3. Iron sulfate (USDA)
4. Straw (USDA)
5. Seed (USDA)
6. Lumber (industry specification)
7. Plants (USDA)
8. Pipes and conduit, except cast-in-place (industry specification)
9. Backflow preventers (industry specification or catalog item)
10. Lime (industry specification or shelf item)
11. Asphalt (industry specification or shelf item)
12. Timber piles (industry specification)
13. Steel plates or shapes shown in the AISC handbook (shelf item)
14. Prestressing steel (industry specification)
15. Expansion joint materials (industry specification)
16. Elastomeric bearing pads (industry specification)
17. Steel bars for reinforcement—the material, not the bending and cutting (shelf or catalog item)
18. Bolts (industry specification)
19. Pumping plant equipment, components only (catalog items)
20. Miscellaneous metal, material, not fabrication (industry specification)
21. Fence posts, wire, fabric, hardware (industry specification)
22. Guide marker posts, plates, reflectors, hardware (industry specification)
23. Metal beam guard railing (industry specification)
24. Metal beam barrier (industry specification)
25. Type 1 lighting standards (industry specification)
26. Electrical conductors (industry specification)
27. Controller components (industry-wide catalogs)
28. Traffic signals and fittings (proprietary item)

29. Lamps for luminaries (proprietary item)
30. Ballasts (proprietary item)
31. Cement (industry specification or shelf item)
32. Pavement markers (proprietary item)

Items that do not fall into the above list and that are produced to meet the requirements of Caltran's plans and specifications are not standard items.

Examples of materials that are usually not standard items include the following:

1. Processed structure backfill material
2. Pervious backfill material
3. Aggregates for bases and subbases
4. Aggregates for cement-treated base, asphalt concrete, portland cement concrete, rock slope protection, screenings
5. Wood chips
6. Portland cement concrete
7. Traffic signal and lighting standards (except Type 1)
8. Controller assembly
9. All material manufactured to meet a state specification such as curing compound, paint, or epoxy
10. Concrete piling

The nonstandard items listed above may contain components that are in short supply. They may then be eligible for consideration in a material shortage situation if the component is a standard item.

- Determine if a "physical shortage" exists.

  The term "physical shortage" means the standard item or component of a standard item is not available at the time it becomes a time-controlling factor. However, do not consider an extension if the physical shortage results from any of the following:

  1. Untimely ordering of material
  2. Failure to make a requested down payment
  3. Lack of credit

  You must presume that a contractor, when submitting a bid, thoroughly considers all aspects of procuring materials and bids accordingly. This thorough consideration can include timely delivery commitments, price, and responsibility for meeting specifications.

  Whenever it has been determined that an industry-wide shortage exists, the Division of Construction will advise all districts.

  A physical shortage will not be considered to exist if either the contractor or a subcontractor has failed to perform any required fabrication or processing.

- 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 cover defaulted contracts.

Termination of control may occur only when a contractor fails to supply an adequate work force, fails to supply material of proper quality, or fails to make proper and timely payments to subcontractors. 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.

3-807A Work Completed by the Surety

As requested by the surety, the construction field coordinator, with the assistance of the district, negotiates a takeover agreement or a tender and release agreement with the surety. A takeover agreement is an agreement between Caltrans and the surety outlining terms and conditions for the remaining contract work to be performed by the surety or a contractor hired by the surety. The surety is not released from contract responsibility until the contract is accepted. A tender and release agreement is an agreement between Caltrans and the surety outlining the terms and conditions for the remaining work to be performed by a contractor hired by the surety. The hired contractor agrees to do the remaining work and provides new bonds, and the surety pays the additional contract costs. The surety is then released from any further contractual responsibility.

Once the construction field coordinator has negotiated an agreement with the surety, the coordinator sends a draft copy of the appropriate agreement to the surety and requests that the surety make project specific revisions as needed. The construction field coordinator will review the agreement and forward it to the Legal Service Center. Both the construction field coordinator and the Legal Service Center will recommend approval. The Division of Construction chief approves either agreement.

During the interim between the termination of the contractor's control of the work and completion by other forces, the district must take all necessary steps to preserve the already completed work. The district may use a separate work order for interim maintenance work by "day labor." Day labor may be obtained by entering into a service contract with another contractor to perform the contract work. To use day labor, a director's order is necessary.

3-807B Work Not Completed by the Surety

If time or circumstance does not permit the surety to complete the work, Caltrans may elect to complete the work with its own forces. If the surety elects not to complete the contract after termination of the contractor's control over the work, the district may complete the work by day labor or by informal contract. The district will determine the amount of completed work, the amount of work remaining to be performed, materials on hand, and extra work authorized. During the interim between the termination of the contractor's control of the work and completion by other forces, the district must take all necessary steps to preserve the completed work. The district may use a separate work order for interim maintenance work by day labor.

An informal contract permits a short advertising period. If the work will be completed by informal contract, the resident engineer, with the assistance of the district office engineer, will put together plans and specifications to complete the work, select three to five bidders, and take informal bids for the work. The informal bids must be sent to the surety for its acceptance before the informal contract proceeds. In some cases, additional funds will be needed to complete the work. The resident engineer must request that the surety provide these funds although, under the Public Contract Code, the surety is allowed to wait until completion of the work to make payment. If the surety does not immediately provide these funds, the resident engineer may use available contingency funds or submit a supplemental funds request, if needed.

If the surety either asks Caltrans to complete the work or Caltrans elects to complete the work, the surety and the original contractor are liable to the state for the costs to Caltrans resulting from the original contractor's failure to complete the work. These costs include:

- The sum paid to the completion contractor to complete the various items to the extent it exceeds the sum that would have been payable to the original contractor.

- The sum of all costs to protect the work during the period between the original contractor leaving and the completion contractor arriving (usually day labor costs).
- The sum of all costs related to corrective contract change order work required to bring the original contractor's work into contract compliance and Caltrans' engineering costs to develop a completion contract and administer it (if appropriate, liquidated damages may be used to estimate these costs).

During completion of the work, the resident engineer must maintain current contract records to expedite billing. The project files must show the following:

- Segregated quantities of work performed under the original contract and under the day labor or informal contract for completion
- Overruns and underruns greater than 25 percent requiring adjustment
- Contract change orders
- All other pertinent information

When the surety does not complete the work, prepare a billing to present to the original contractor and surety. The resident engineer must break down the billing into the following five sections:

3-807B (1) Section 1

Subsection A—This subsection lists the amount Caltrans paid for the entire contract item work. (This amount would be equal to the sum of the amount paid to the original contractor for item work before the termination plus the amount paid to the completion contractor to complete the item work.)

Subsection B—This subsection shows the amount that would have been paid for the item work assuming the original contractor had not defaulted on the contract.

Subsection C—This subsection lists the amount billable to the original contractor or surety under Section 1 of the billing. This amount would be the difference between Subsection A and Subsection B. If Subsection A is less than Subsection B, the original contractor must not be credited with this amount; instead, a zero balance will apply.

3-807B (2) Section 2

This section lists the costs Caltrans incurred to maintain the contract during the period between the original contractor's departure and the arrival of the completion contractor. (These costs are usually day labor costs, but may include costs incurred by Caltrans' maintenance forces.)

3-807B (3) Section 3

This section lists the contract change orders and related costs to correct any defects left in the original work by the original contractor.

3-807B (4) Section 4

This section lists the engineering costs Caltrans incurred to develop, implement, and administer the completion contract. Separate the administrative costs from the development and implementation costs. Compare the total administrative engineering costs with the liquidated damages costs incurred in the original contract, assuming the original contract was not complete until the completion contractor completed its contract.

3-807B (5) Section 5

In Section 5, show the amounts determined in Sections 1, 2, 3, and 4 and add them together. List the penal sum of the bond (along with the bond number).

The penal sum of a performance bond limits the responsibility of the surety. The original contractor may be billed for the full cost of completion even when that cost exceeds the penal sum of the bond

3-807C

The resident engineer will send the detailed billing, as described above, to the Division of Accounting Services, Abatements Section, with instructions to prepare the accounts receivable bill and to mail it to the contractor. If the contractor is not available, it should be mailed to the surety. After payment is received, the Abatements Section will credit the payment to a specific expenditure authorization.

If payment is not received within 45 calendar days, the Abatements Section will inform the district construction deputy director that payment has not been received. Representatives of district construction, the Division of Construction, and the Legal Service Center will meet to discuss alternate courses of action and choose the appropriate one. The Abatements Section must not submit the billing to a collection agency unless the meeting participants have agreed to this action.

Keep backup documents in the project files and make them available to the surety upon request. To ensure special handling of defaulted contracts, identify all related internal correspondence with the words "Defaulted Contract" under the job's file reference.

3-808 Right of Way Delays

Section 8-1.09, "Right of Way Delays," of the *Standard Specifications*, covers provisions relating to right-of-way delays. The contract contains these provisions from the *Standard Specifications*.

Resident engineers must monitor the progress of any work that may cause a right-of-way delay. Initiate action to avoid or mitigate the effects of delays. Such actions include the following:

- Adequately perform all duties related to the engineer as covered in "Utility and Non-Highway Facilities" below.
- Initiate requests to the district utility coordinator to modify agreements that would allow the contractor's forces to perform work under contract change order. Section 8-1.10, "Utility and Non-Highway Facilities," of the *Standard Specifications*, covers such work by the contractor.
- Initiate any changes in the order of work that would eliminate or mitigate a right-of-way delay, provided that any cost involved would not exceed the estimated cost resulting from a delay.

If a right-of-way delay occurs, take the following actions:

- Determine the length of the delay.
- Make a list of the equipment that will be affected by the delay. Attempt to get agreement from the contractor regarding the list's accuracy.
- Estimate the cost of the delay using the method specified in Section 8-1.09, "Right of Way Delays" of the *Standard Specifications*.

3-808 Right of Way Delays

- Estimate the cost of removing the affected equipment from the project and returning it when the delay is over.
- Compare the costs and choose the most cost-effective option. If the contractor removes the equipment, but the cost for doing so is higher than leaving the equipment on the project, only pay the delay cost for idle equipment.
- If the contractor does not remove the equipment, attempt to determine how the contractor intended to use the delayed equipment. Review the progress schedule to determine if the contractor intended to use the delayed equipment full time or if the contractor intended some idle time. Use this estimate of time when determining delay costs.

3-809 Utility and Non-Highway Facilities

3-809 Utility and Non-Highway Facilities

3-809A General

An engineer must be assigned to coordinate and inspect utility relocation that is being done to clear the right-of-way before construction. A resident engineer, once formally assigned to a project, assumes primary responsibility for coordinating and inspecting this kind of utility relocation. Either the resident engineer or an assigned assistant resident engineer must make all contacts with utility facility owners to schedule work and coordinate with the contractor's operations. The district right of way unit, acting through the district utility coordinator, is responsible for making changes to "Notice to Owner" forms and to right-of-way agreements. The district right of way unit must also make all decisions about financial liability between Caltrans and owner for utility work. All change orders involving utility work must be sent to the district utility coordinator for concurrence.

3-809B Duties of the Utility Relocation Resident Engineer

The utility relocation resident engineer must perform the following duties:

- Review all documents about utility relocation work, including the "Notice to Owner," encroachment permits, special provisions, contract plans, and correspondence about utilities not shown on the plans.
- Check the location of proposed or existing utility installations for possible conflicts with proposed construction.
- Determine whether Caltrans or utility forces must establish necessary lines and grades. If Caltrans forces are responsible, ensure that necessary lines and grades are properly established so that relocation crews can efficiently pursue the work. For possible conflicts, compare all facilities with available plans. Also, spot-check survey marks at critical locations for possible conflicts. Require changes where necessary.
- Submit to the district utility coordinator any changes or any notices of newly discovered facilities. These changes or new discoveries should be entered on the contract plans or in the special provisions whenever such entries can be made before contract advertising. Notify the project resident engineer of any such changes or new facilities that cannot be included in the contract.

- Include utility owners and the district utility coordinator in preconstruction conferences with the contractor. On larger projects with a number of utility relocations, it is advisable to schedule a separate meeting for each owner. In these meetings, discuss the following items:

  1. Special provision requirements
  2. The contractor's schedule as it affects relocation work, project safety, and traffic control
  3. Any potential problems

  Keep records of such meetings, and confirm any decision through letters to all parties.

- Before allowing any change in the planned location of a utility facility or any excavation to determine the location of underground utility facilities, ensure such action complies with the "Policy on high and low risk underground facilities within highway rights of way," in Appendix LL of the *Project Development Procedures Manual*.

- The district utility coordinator will advise the resident engineer when utility relocation work warrants full-time inspection. Keep records of utility relocation work on Form CEM-4601, "Assistant Resident Engineer's Daily Report". When inspection is full time, keep the records as complete as possible for the following:

  1. Number of workers
  2. Equipment description
  3. Hours worked
  4. Materials salvaged

- When inspection is part time, record as much detail as is consistent with observed activity. At a later date, the district right of way unit will request these records to verify the utility owner's final bill.

- Keep the contractor advised of any utility work that will require a change in the contractor's operations. Keep detailed records of any alleged or actual right-of-way delays related to utilities. Make recommendations to the district on any requests for time extensions or other adjustments resulting from such delays. See Section 3-805A (2), "Time Extensions (the Center Block)," of the *Construction Manual* for procedures for time extensions.

- The contractor is required to notify the resident engineer in writing of any discovery of any underground facility not indicated on the plans or in the special provisions. In the absence of such written notification from the contractor, you should document the location of the underground facility and include this documentation in written confirmation with the contractor.

- Whenever the contractor has not received prior indication of an existing facility, change orders, including the repair of any accidental damage, will be considered for approval. However, Caltrans will not pay for the repair of any accidental damage caused by negligence after the contractor was notified of the existence of a utility facility.

- Whenever underground facilities are discovered that are not in the plans or the special provisions, notify the district utility coordinator. The various parties involved can then reach an agreement with the utility owner about satisfactory protection before the Caltrans contractor begins any physical work. If the contractor must protect the utility facility, prepare a change order to cover the payment for such work. "Protection work," as used in contract administration, must include any work necessary to ensure the utility's service, reliability, or both, continue at approximately the same level as before any disturbance from construction operations. This work may include exploration to find exact locations, placement of barricades or warning devices, shoring, or even temporary bypass facilities or permanent relocation. However, "protection work" will not include facility repairs for damage resulting from negligent equipment operation around properly protected facilities.
- Notify the district utility coordinator immediately of any utility facility that is in conflict with the planned work. Follow up the notification in writing. Include drawings or plan sheets showing the location of the existing facility, the affected work, recommended action, and the estimated date when the conflict will begin to affect the contractor's operations and time of completion. The district utility coordinator must arrange any relocation work necessary to resolve the conflict.
- Determine whether facilities shown on the plans or specifications are being adequately protected from damage as required by the contract. Notify the contractor in writing of any inadequacies.
- When judging the extent of compliance the specifications require, take into account the type of facility involved. Consider such things as the consequence of a potential accident. When these consequences involve life and limb, do not permit work in such areas unless the contractor has made physical checks of the facility location. When working around hazardous facilities, do not assume takeoffs from plans (either Caltrans' or those from an owner) are accurate.

3-810 Termination of Contract

3-810 Termination of Contract

Section 8-1.11, "Termination of Contract," of *the Standard Specifications,* specifies the contractual requirements for termination when the district director determines, and the deputy director of Project Delivery approves, that it is in Caltrans' best interest not to continue with the project.

When the majority of the contract work has been completed, it is normally not the preferred alternative to terminate the contract. Instead, it is preferred to delete the remaining work by contract change order and accept the contract, and provide additional payment to the contractor, if necessary, in accordance with Section 9-1.08, "Adjustment of Overhead," of the *Standard Specifications*.

Termination of contracts is comparatively rare. Section 4412 of the Government Code covers contracts terminated for convenience in the best interest of Caltrans. The Division of Construction must ensure that all necessary steps are taken in handling contracts terminated for Caltrans' convenience. To ensure the special handling of these types of terminated contracts, identify all internal correspondence related to them with the words "Convenience Termination" under the job's file reference.

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*.

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Section 9 Measurement and Payment

Section 9 Measurement and Payment

3-901 General

3-901 General

This section covers measurement and payment of contract item work and extra work, partial payments, and payment to the contractor after contract acceptance.

3-902 Payment Methods

3-902 Payment Methods

The specifications for Caltrans contracts provide the following methods to make the ultimate total payment for all work performed:

- Payment for contract items at contract unit prices
- Adjustments to contract prices (known as adjustments in compensation)
- Payment for extra work at agreed unit prices, force account, or lump sum
- Deductions from monies due under the contract

3-903 Measurement and Payment of Contract Item Quantities

3-903 Measurement and Payment of Contract Item Quantities

Contract work, as bid on by the contractor, is measured and paid for as contract items. Contract items are measured for payment as units. The unit for each contract item is shown in the engineer's estimate as "unit of measure." Contract items may be measured by units of count, length, area, volume, weight, or lump sum. The engineer's estimate also includes the estimated quantity of each contract item. Resident engineers and assistant resident engineers must determine, by measurement and calculation, the quantities of the various contract items actually performed by the contractor.

3-903A Method of Measurement

Check the "measurement" or "measurement and payment" clauses in the specifications for the required method of measurement for each contract item. Use the specified method to measure quantities. For more information about measuring quantities for specific contract items, see Chapter 4, "Construction Details," of the *Construction Manual* (manual).

A change in the unit or the method of measurement changes the contract. Do not change the unit or the method of measurement unless the change is provided for in a contract change order.

3-903B Accuracy

Measure and calculate contract item quantities to a degree of accuracy consistent with the contract price of the item. Give early consideration to the accuracy desired so that all personnel on a given project will measure and calculate uniformly. The general rule is to measure to a degree of accuracy that, when calculated, the resulting value will be accurate within 0.2 percent to 0.5 percent. A $50,000 item should be measured and calculated to result in payment accurate within about $100.

3-903C Source Documents

Enter measurements and calculations for contract item quantities on permanent record sheets that are commonly referred to as "source documents." Include on each source document the appropriate contract item number, the location of installation (if applicable), the necessary measurements and calculations, and the name of the person preparing the document. Check source document calculations independently, and enter the name of the checker on the document.

Check source document calculations as soon as possible, preferably before the quantity is entered on a progress pay estimate. Always check them before entry on the proposed final estimate. Whenever possible, measure, calculate, and check contract item quantities as the work on a contract item is completed. Resident engineers must assign responsibility for checking calculations to assistant resident engineers in the same manner that other project responsibilities are assigned.

Enter into the system for progress payment the quantities from the source documents. For a description of the progress payment process, see Section 5-1, "Project Records and reports," of this manual.

3-903D Audit Trail

State the source of any figure, calculation, or quantity shown on the source document. For instance, a quantity may be the result of a field measurement, scale weights, a count, or a calculation based on planned dimensions.

Create a clear and easily followed trail for the total pay quantity in the proposed final estimate back to the first measurement or calculation for each contract item.

Consider organizing source documents for each contract item so an easily followed audit trail exists. Category 47, "Drainage Structures," in Section 5-102, "Organization of Project Documents," of this manual, provides a very good system, especially for large projects, for organizing source documents for drainage related contract items. Category 48, "Contract Item Quantity Documents," in the same manual section, describes the numbering system to be used for source documents for other contract items.

3-903E Weighing and Metering Procedures

The following describes the duties and responsibilities of the people involved in weighing and metering materials and the procedures for ensuring accurate measuring and metering:

3-903E (1) Personnel

The process of determining contract item quantities by weighing and metering includes the following personnel:

- The resident engineer
- Assistant resident engineers
- The district weights and measures coordinator
- The Division of Construction weights and measures coordinator

In addition to Caltrans personnel, the following people also are involved in the weighing and metering process:

- County sealers of weighing and measuring devices
- Representatives of the Division of Measurement Standards

- Private scale technicians performing California Test 109, “Test for Weighing and Measuring Devices”

3-903E (2) Responsibilities

All Caltrans personnel must be alert for conditions that contribute to failure to obtain the accurate weight and measurement of materials. The following describes the typical duties and responsibilities for ensuring compliance with the specifications for weighing and metering:

3-903E (2a) Resident Engineers

The resident engineers must do the following:

- Ensure accurate weighing and measuring through adequate inspection.
- Routinely determine that proper weighing procedures are used.
- Ensure that the spot-checking of weighing procedures is recorded in daily reports.
- Require the contractor to correct any malfunctioning weighing or metering device.
- To ensure accuracy, order the resealing and retesting of scales and meters as often as necessary.
- Determine when load slips are to be used. Order the use of load slips except when the number of loads is very small or conditions preclude that proper weighing procedures be used. In the daily report, record the reasons for not using load slips.

3-903E (2b)District Weights And Measures Coordinator

The district weights and measures coordinator must do the following:

- Provide technical assistance to the resident engineer and assistant resident engineers.
- Provide information to resident engineers regarding the adequacy of scales and the validity of seals.
- When requested by the resident engineer, witness the testing of scales or meters in compliance with the requirements of California Test 109, “Test for Weighing and Measuring Devices.” For California Test 109 procedures, see Section 3-12, “Accuracy and Suitability of Scales and Meters (Materials-Producing Plants),” of the *Quality Assurance Program Manual*.
- Furnish copies of California Test 109 report to each project using a scale tested in accordance with California Test 109.
- Furnish and attach Form CEM-4204, “California Test 109 Sticker,” to tested scales.
- Maintain a file on the current status of all scales that are commonly used for weighing materials for Caltrans projects in the district.
- On request, provide scale status information to adjacent districts.
- Perform spot-checks of weighing and metering devices and procedures in the district, and furnish written reports to the resident engineer.

- Determine whether any weighing or metering problems should involve the Division of Measurement Standards. Request any such involvement through the Division of Construction weights and measures coordinator.

3-903E (2c) Assistant Resident Engineers

Assistant resident engineers act for the resident engineer and, depending on the authority delegated to them, do the following:

- Observe the installation of scales installed primarily for use on a given project. Decide whether such scales and appurtenances meet the requirements of the specifications. When necessary request assistance from the district weights and measures coordinator.
- Inspect and observe the general condition of all scales used on the project. If the scales are in questionable condition, request advice from the district weights and measures coordinator.
- Request a material plant approval report from the district weights and measures coordinator on the validity of the current seals. If a seal or Form CEM-4204 is not valid, require the contractor to have the scales tested before use.
- Witness scale testing. Determine that the scales have been tested to the capacity for which they are being used on the project. Request the district weights and measures coordinator to observe the procedure.
- Whenever a scale is moved, overhauled, or shows obvious deficiencies, require the scale to be restored to normal operating condition and then retested.
- To observe the weighing of materials, visit the scale house or plant periodically. If necessary, request technical assistance from the district weights and measurement coordinator. Check the scale sheets and load slips to ensure they are being used properly.
- Spot-check tare and gross weights to see that weigh masters are using the correct tare. Ensure the weigh master is licensed for the scale location.
- Observe all meters that are required under the contract, and ensure they have been tested and sealed.
- Collect load slips at the point of delivery. A Caltrans employee should be present at the work site to collect load slips. Sign or initial the load slip or weight certificate to indicate that the represented material was used in the work.

When certified summary scale sheets are used, and load slips are not used, verify that material shown on the summary sheets has been used in the work. Do this verification by using a tally sheet, a spread record, or a random check. In the daily report, record that the material has been used in the work and also the verification method. Sign the summary scale sheets to certify that the represented material, less any material deducted from the total, was used in the work

Return to the contractor a copy of any load slips or scale sheets representing loads or partial loads that are not to be paid for. On the load slip or scale sheet, indicate the quantity of material not included for payment. Retain a copy for the project records. When a determination is made to reduce the quantity, advise the

contractor's foreman or superintendent of the amount and reason for the reduction. In the daily report, note the reduction and the name of the contractor's employee who you advised of the reduction.

3-903E (2d) Contractors

The following describes some of the duties and responsibilities of contractors and their agents in using scales and metering devices for measuring and proportioning materials:

- The contractor and materials suppliers must maintain scales and meters within the accuracy required by the Division of Measurement Standards.
- The owner of the scale or meter must maintain it in good operating condition at all times. If breakdowns or suspected inaccuracies occur, the owner must make repairs. After repairing a commercial device, the owner must notify in writing the county sealer of weights and measures that this work has been done. The device must be resealed before it is used to weigh materials for payment. For non-commercial devices, the contractor must ensure California Test 109, "Test for Weighing and Measuring Devices," is performed. In either case, the contractor must notify the resident engineer at least 24 hours before any scheduled testing so that the testing can be witnessed.
- The resident engineer may recommend to the contractor the following procedure for obtaining tests by the county sealer of weights and measures:
    1. Contact the county sealer of weights and measures directly by telephone and request testing followed by written confirmation of the request.
    2. When the county sealer of weights and measures cannot respond to the contractor's request in a reasonable time, the contractor should contact the Division of Measurement Standards.

Do not directly contact the county sealer of weights and measures for the contractor. The owner of the measuring device must request the testing. The resident engineer may only inform the contractor that such testing is necessary.

The district weights and measures coordinator may contact the Division of Construction weights and measures coordinator on any question regarding the validity of a seal or the legal capacity of a scale.

3-903E (2e) Division of Construction Weights and Measures Coordinator

The Division of Construction weights and measures coordinator does the following:

- Ensures the weights and measures program is operating satisfactorily throughout the various Caltrans districts.
- Serves as a contact between the district weights and measures coordinators and the Division of Measurement Standards.
- Keeps the district weights and measures coordinators informed of the latest equipment and techniques being developed throughout the industry.

3-903F Adjustments in Compensation

An adjustment in compensation is a monetary increase or decrease applied to the contract price of a contract item. The adjustment is a change to the contract and must be made by contract change order. Adjustments in compensation are either unit adjustments to the unit price of a contract item or they may be a lump sum increase or decrease applied to a contract item.

Section 4-1.03B, "Increased or Decreased Quantities," Section 4-1.03C, "Changes in Character of Work," and Section 9-1.08, "Adjustment of Overhead Costs," of the *Standard Specifications*, provide for adjustments in compensation. The special provisions may also provide for adjustments in compensation. One example is the special provision section titled "Compensation Adjustments for Price Index Fluctuations."

For more discussion about determining adjustments in compensation, see Section 3-4, "Scope of Work," and Section 5-3, "Contract Change Orders," of this manual.

3-903G Final Pay Items

Section 9-1.015, "Final Pay Items," of the *Standard Specifications*, defines and specifies the procedure for calculating pay quantities for final pay items.

3-904 Payment for Extra Work

3-904 Payment for Extra Work

For a definition and discussion about extra work, see Section 3-4, "Scope of Work," of this manual. Before payment can be made for extra work, the resident engineer must issue an approved contract change order. Section 5-3, "Contract Change Orders," of this manual, includes a discussion and examples of contract change orders providing for extra work. This section also discusses the two methods specified for paying for extra work: agreed price and force account.

3-904A Agreed Price

See Section 5-306C (2a), "Extra Work at Agreed Prices," in this manual, for guidelines for determining agreed prices and writing contract change orders that authorize agreed price payment.

The resident engineer may prepare Form CEM-4902, "Extra Work Bill (Short Form)," to make payments for extra work at the agreed price. The contractor's signature on the extra work bill is not required. For information on preparing extra work bills and entering data into the automated progress pay system, see Section 5-1, "Project Records and Reports," of this manual.

3-904B Force Account

The force account method, used to determine payment for extra work, consists of adding specified markups to the actual cost of labor, equipment, and material used to perform the extra work.

Section 9-1.03, "Force Account Payment," of the *Standard Specifications* specifies the force account method of payment. Section 5-3, "Contract Change Orders," of this manual contains examples of contract change orders with payment for extra work at force account. The following are the procedures for paying for extra work at force account:

3-904B (1) Authorization for Force Account Payment

On the authorizing contract change order, always show the amount to be paid for extra work at force account as an estimated amount. For the format for contract change orders, see Section 5-3, "Contract Change Orders," of this manual. You may make payment for extra work in excess of the estimated amount shown on the contract change order up to 100 percent of the estimated amount or $15,000, whichever is smaller. To authorize any additional payment, use a supplemental contract change order.

3-904B (2) Approval of Labor, Equipment, and Material

Section 9-1.03, "Force Account Payment," of the *Standard Specifications* states that labor, equipment, and materials used in the performance of extra work paid for on a force account basis are subject to the approval of the resident engineer. Normally the contractor will use labor and equipment that is on the site and used for work in progress. The contract change order will usually specify materials to be used in the extra work. However, before the work begins, the resident engineer should discuss with the contractor the labor, equipment, and materials to be used. The resident engineer can avoid misunderstandings and inefficiencies by knowing the resources to be used ahead of time. After the work is performed, Caltrans must pay the contractor for material used and at the appropriate rates for the number of hours that labor and equipment was used.

3-904B (3) Billing for Extra Work at Force Account

The following are the procedures for billing for extra work at force account:

- The contractor must submit Form CEM-4902, "Extra Work Bill (Short Form)," covering extra work under each contract change order each day that extra work is performed. The resident engineer must ensure that the contractor has a supply of the forms. See Section 5-103E, "Preparing Form CEM-4902, Daily Extra Work Report," of this manual for detailed instructions for the use of Form CEM-4902.
- Field construction personnel must do the following when reviewing extra work bills:

  1. Compare extra work bills against daily extra work reports and tentative agreements, if they are used. Make this comparison to verify the correctness of the contractor's billing, and to avoid the possibility of a duplicate payment for the same work. For a discussion of daily extra work reports and tentative agreements, see Section 3-904D, "Extra Work Records" and Section 3-904F, "Tentative Agreements," later in this section.
  2. The contractor must include everything to be paid for on the extra work bill. Do not add any items even though you know them to be legitimate charges. Instead, call the omission to the contractor's attention. The contractor may submit a supplemental extra work bill to include the omitted items.
  3. Delete items for which the contractor is not entitled to payment.
  4. You may correct hours for labor and equipment downward, but not upward.
  5. Do not correct wage rates that the contractor has submitted. Return any extra work bill with incorrect wage rates to the contractor. Note that Caltrans must pay for extra work at the same wage rate paid by the contractor. Do not refuse to pay a particular wage rate because it is above the prevailing wage rate.
  6. Correct equipment rental codes that are obviously in error, or return the reports to the contractor for correction. Ensure the rental codes shown are for the equipment that was actually used.
  7. The person, whether a contractor or Caltrans employee, who makes corrections to an extra work bill must sign (not initial) and date the correction.
  8. Maintain a log of extra work bills received and returned to the contractor.

The resident engineer must sign the extra work bill to authorize payment for extra work. The resident engineer's signature accepting an extra work bill for progress payment certifies that payment is in accordance with contract requirements and established administrative procedures.

3-904B (4) Labor

When work is paid for on a force account basis, Section 9-1.03A, "Work Performed by Contractor," of the *Standard Specifications*, specifies that a 33 percent markup is to be applied to the cost of labor.

A "labor surcharge" is included in the cost of labor. The *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book in effect at the time the work is performed contains the labor surcharge percentage. One general rate applies to most crafts, and the book contains several higher rates for certain crafts. The resident engineer must determine the correct surcharge percentage to be used and verify that the percentage has been entered on the extra work bill.

At times a superintendent or owner acts as a working foreman or an equipment operator or works at some other craft. In such situations, make payment on a "value received" basis. Payment will be made for owners or supervisory personnel at the proper rate for the work performed. For example, pay for a superintendent acting as a foreman on force account work at the normal hourly rate for a foreman. Do not prorate the superintendent's weekly or monthly salary to an hourly rate. In paying for a superintendent on force account work, make the payment on a functional basis and not on a position or classification basis.

On some projects, a superintendent or project manager directs the activities of several foremen or one or more general foremen who directly supervise the foremen. The general foremen are sometimes referred to as superintendents, such as grading superintendents or paving superintendents. This change in nomenclature does not change the functional nature of these positions. They are general foremen or foremen and are not considered to be supervisory or overhead personnel. Make payment at the actual hourly rate paid by the contractor when such personnel function as foremen on force account work.

When paying for salaried personnel, do not authorize force account payment for overtime hours unless the contractor has an established practice of paying overtime to salaried personnel. The usual case is that the weekly or monthly salary covers the number of hours required by the work.

The *Standard Specifications* allow for payment of the actual subsistence and travel allowances paid by the contractor.

Pay per diem and travel allowances on force account only when the contractor is paying these allowances on contract item work.

When seven-day subsistence is included in labor contracts in lieu of per diem and travel time, subsistence will be paid for the entire period involved if the workers are employed full time on force account.

When workers are employed on both force account work and contract item work in the same day, prorate subsistence payments and travel allowances between the contractor and Caltrans. Base the prorated amount on the first eight hours worked. Do not pay per diem for time worked after the first eight hours in any one day.

3-904B (5) Equipment

For the specifications for paying for equipment used for extra work paid for on a force account basis, see Section 9-1.03A(3), "Equipment Rental'" of the *Standard Specifications*. The following are guidelines for paying for equipment rental:

3-904B (5a)Approval of Equipment

The resident engineer must approve equipment for use on force account work. Before giving approval, determine whether available and suitable equipment is already at the job site or whether equipment not presently at the job site is required. For example, a piece of equipment on the job site that can perform a given operation satisfactorily may be larger than necessary. Determine whether it will be economical to use the oversized equipment at its rate or to obtain equipment of the proper size. Obtaining equipment from off-site necessitates payment for move-in and move-out expenses and for minimum rental periods. See Section 9-1.03A(3b), "Equipment not on the Work," of the *Standard Specifications*. The determination may also be based on other factors, such as public safety and the urgency of the work.

Apply these considerations to equipment at the job site when the equipment has accessories or attachments that are not necessary for the extra work. Payment for such equipment is to be made in accordance with the conditions under which it is approved. Pay for equipment as approved by the reisdent engineer, and not necessarily as it is equipped. For short or intermittent periods of use, such as eight hours or less, normally approve equipment with unneeded attachments or accessories and pay for them. For longer operations, allow the contractor the option of furnishing equipment with needed accessories only or of accepting payment without compensation for unnecessary attachments or accessories.

Some equipment includes accessories as an integral part of the basic machine. When accessories are an integral part of the machine, the rates in the *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book indicate that the accessory is included in the quoted rate. Do not make deductions for accessories on such integral equipment. For unusual situations, consult the Division of Construction.

3-904B (5b) Equipment Rental Rates

The *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book contains rates for most of the equipment used on Caltrans projects. However, the Division of Construction has also established rates for some equipment that is not in the Labor Surcharge and Equipment Rental Rates book. These rates are available on the Caltrans Division of Construction web site. To establish rates that are not listed in the *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book or on the web site, use the following procedure:

- Obtain a complete description of the equipment, including the manufacturer, model number, horsepower, size or capacity, and accessory equipment.
- If the equipment is nonstandard or unusual, request the following data from the contractor:
    1. Type of equipment (such as segmented, self-propelled, rubber-tired roller, telescoping hydraulic crane, articulated, or rubber-tired roller)

2. Trade name
3. Model and serial numbers
4. Year manufactured
5. Size, capacity, or both
6. Type and amount of power
7. Whether crawler, rubber-tire, or other
8. Manufacturer or distributor (if local, give address)
9. Initial cost of the basic machine and attachments
10. Operating requirements, costs, or both, if available or unusual
11. Name of owner

- Transmit this information to the Division of Construction. The Division of Construction will establish a rental rate, codes, and effective time period and advise the district by mail, e-mail, or fax. Use this document as the authority to pay the rate established.
- The contractor must be advised of the codes so that its billings can include them.
- For equipment not on the work, and in special circumstances, the *Standard Specifications* permit a rate to be paid that is in excess of the rate listed in the *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book. When the contractor proposes a rental rate in excess of the listed rate, ensure the equipment meets all the conditions listed in Section 9-1.03A(3b), "Equipment not on the Work," of the *Standard Specifications*. The higher rate will constitute a change to the contract and must be established by a contract change order. Use the following procedures to determine the rate:

  1. Obtain a written statement from the contractor. The statement must include the proposed rate and the justification that Section 9-1.03A(3b), "Equipment not on the Work," of the *Standard Specifications* requires.
  2. Decide whether the conditions of use and ownership of the equipment meet all the specified criteria for payment of the higher rate.
  3. Submit a contract change order that provides for the proposed rate. State in the contract change order whether or not the table titled "Hours Equipment is in Operation" is applicable. The table appears in Section 9-1.03A(3b), "Equipment not on the Work," of the *Standard Specifications*. If the equipment is used for contract item work, use the normally established rental rates for the entire time the equipment is used for extra work. Include in the contract change order a clause similar to the following: "In the event this equipment is subsequently used on contract item work, this rate is void."
  4. Include justification for approval in the contract change order memorandum, and attach the contractor's letter.

- Equipment for which the rental rate is not shown in the *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book, but for

which the Division of Construction established a rental rate, is eligible for the higher rate, providing all necessary conditions are met.

3-904B (5c) Equipment Not on the Work

In general, the contractor schedules extra work paid for on a force account basis and uses equipment available on the project. However, circumstances may require use of equipment not at the site that must be brought in especially for the extra work. The resident engineer must make decisions regarding the type of equipment and scheduling its use. Section 9-1.03A(3b), "Equipment not on the Work," of the *Standard specifications*, specifies the requirements for paying for the use of such equipment. This specification does not apply when the contractor uses equipment for any contract item work. Change any previous payment as "equipment not on the work" to payment as "equipment on the work" when such equipment is used for contract item work.

Order the equipment removed from the project, pay move-out and possible subsequent move-in costs, or continue paying for the equipment during a suspension in extra work. Temporary removal of the equipment to the contractor's shop or a storage area off the project is not removal from the project. To end payment for the equipment, the resident engineer must order its removal.

3-904B (5d) Owner-Operated Equipment

Section 9-1.03A(3c), "Owner-Operated Equipment," of the *Standard Specifications*, specifies the method for paying for owner-operated equipment, except dump trucks, on a force account basis. Determine the operator's hourly rate of pay in accordance with Section 9-1.03A(3c). To determine the correct rate, request assistance, if necessary, from the district labor compliance officer.

3-904B (5e)Dump Truck Rental

Section 9-1.03A(3d), "Dump Truck Rental," of the *Standard Specifications*, specifies the method for paying for dump truck rental on a force account basis. Section 9-1.03A(3d) covers both renting owner-operated dump trucks and renting dump trucks from a truck broker.

The resident engineer must establish the hourly rate to be paid for dump truck rental. The actual hourly rate paid by the contractor or the truck broker may be the established rate if it is consistent to rates paid for the same trucks on other work. For help in establishing hourly rates, compare with rates paid for similar equipment on other Caltrans work.

3-904B (5f) Time in Operation

Field engineers must determine the rental time to pay for equipment in accordance with Section 9-1.03A(3a), "Equipment on the Work," of the *Standard Specifications*.

In general, consider equipment to be in operation when all of the following conditions exist:

- The equipment is at the site of the extra work or being used to perform the extra work.
- The equipment is not inoperative due to breakdown.
- The force account work being performed requires the equipment.

Use the following examples as guidelines for determining rental time to be paid for equipment.

- An air compressor is at the site for eight hours on a force account operation. It is actually used for only a few periods during the eight hours, but it is impractical to use it on other work during the standby periods. Pay for the compressor and all accessories used intermittently for the entire period. The engine does not have to be running continuously during the period to qualify for payment. If the air compressor was also used on contract item work intermittently, prorate the eight hours between the extra work and the item work.

- An air compressor is at the site for eight hours. It is used for the first two hours, but after those hours, it is no longer needed. Pay the rental for only two hours whether the contractor chooses to remove it or chooses to leave it at the site of the work. Apply the same reasoning if the time of operation occurred at any other time of the day. In this example, if a pavement breaker was needed intermittently for two hours and a tamper intermittently for two hours, pay two hours for each tool. If the pavement breaker is needed for the first hour and the tamper for a second hour, pay one hour for each. Advise the contractor when equipment is no longer needed at the site. In the daily report, record this notice and the time.

- A skip loader is used to load dump trucks. The operation is not balanced because one of the dump trucks broke down. However, the resident engineer allows the operation to continue because it is critical. The skip loader is used only about one-half time intermittently during the shift. Make payment for the loader for the entire shift. In a situation such as this one, the resident engineer must try to do whatever is necessary to balance the operation. When balancing cannot be achieved, the resident engineer must decide whether suspending an operation is more economically feasible than allowing it to continue.

  Sometimes two pieces of equipment perform extra work at force account, yet the work does not require full-time use of both. In such instances, it is appropriate to approve (but not order) the use of only one operator for both pieces of equipment. Determine the rental time in the same manner as if each piece of equipment had a full-time operator and was used intermittently.

  On extra work at force account, pay the same time for a foreman's pickup truck that you would pay for the foreman.

<u>3-904B (5g) Standby Time</u>
Pay standby charges for commercial delivery at the invoice rate.

3-904B (6) Material

Payment for material purchased for force account work must be supported by a copy of the vendor's invoice whenever possible. If no individual invoice is available, as in the case of materials taken from contractor's stock, a copy of the mass purchase invoice may be used as support. If no invoice is available to support unit purchase prices, submit a statement with the extra work bill. In the statement, explain how the unit prices were verified. Any invoice the contractor submits must represent the material actually used.

3-904B (7) Work Performed by Special Forces

Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the *Standard Specifications*, allows specialist billing for extra work paid for on a force account basis. Districts must establish procedures to pre-approve specialist billing. Specialist billing must not be used to circumvent competitive bidding or the normal force account method for determining payment. In general, specialists are to be used only for minor portions of the work. Any major work is to be covered under a change order specifying the method of payment.

Do the following when considering the use of specialists:

- Before work begins, decide whether the work is normally done by any of the contractor's forces. The contractor's forces include any firms or organizations performing contract item work, including subsidiaries of such firms or organizations and subsidiaries of the contractor. Subsidiaries of a subcontractor are considered to be a part of the subcontractor's organization. If you decide that the contractor's forces can perform the work expediently, require billings in accordance with Section 9-1.03A, "Work Performed by Contractor," of the *Standard Specifications*, or negotiate an agreed price to establish a payment basis.
- Allow the contractor to hire a specialist only if an established firm with established rates would do the work.
- Decide whether force account work requiring a fabricating or machining process off the project should be billed as specialist work. Such work may qualify as specialist work even though a project contractor or subcontractor performs the work.
- Pay for the transportation of fabricated or manufactured items and all work at the job site in accordance with Section 9-1.03A.

3-904C Five Percent Markup for Subcontracted Work

Section 9-1.03A, includes an extra work markup of 5 percent for the prime contractor when a subcontractor performs the work.

When an engineer's cost analysis is based on force account, using rates as specified in the contract, include a 5 percent markup within the calculation of the work performed by a subcontractor in the following situations:

- Extra work at the agreed price in accordance with Section 4-1.03D, "Extra Work," of the *Standard Specifications*.
- Work performed before item elimination in accordance with Section 4-1.03B(3), "Eliminated Items," of the *Standard Specifications*.
- Contract item adjustment due to increased or decreased quantities in accordance with Section 4-1.03B(1), "Increases of More Than 25 percent," and Section 4-1.03B(2), "Decreases of More Than 25 Percent," of the *Standard Specifications*.
- Change in character adjustment in accordance with Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications*.

3-904D Extra Work Records

On daily reports, record observations and inspections of extra work in progress in sufficient detail to provide a reasonable basis for agreement on payment. Records must be original, not a copy from other documents.

Include the following information when appropriate to the method of payment for the work:

- Description of work performed. This description must be consistent with the description of extra work authorized by the contract change order.
- Time and date of inspection.
- The change order number.
- Location of work.
- Types of labor, equipment, and materials used.
- Estimated hours worked.
- General measurement or amount of work accomplished.

Make entries on the day of observation. If clarifying reports are necessary to cover work not previously reported, state the facts as known and date the clarifying report as of the day it is written.

3-904E Force Account Records

When extra work is performed at force account, decide whether the magnitude of the work warrants the full-time presence of an assistant resident engineer. An assistant resident engineer assigned full time must include in the daily report the number of hours actually worked at the site. The daily report must also contain a reference to any known off-site work.

When an assistant resident engineer is assigned only part time, daily reports must present only known facts. On the daily report, record that inspection was "intermittent." A typical entry might read as follows:

> 6/26/00-10:15 a.m.-CCO No. 17-Placing Riprap Lt. of Sta. 500.
>
> Crew of two laborers and foreman with a D-6 crawler tractor with sideboom and operator laid about 50 sq. m of salvaged rubble riprap. Estimate crew and tractor worked about 4 hours.

Include notations concerning decisions to allow or deny payment for work that may be in dispute or not considered a legitimate part of extra work. Similarly, prepare a supplemental daily report if it is later found that the number of hours or labor and equipment was substantially different than recorded on the original daily report. Such a supplemental daily report might read as follows:

> Hours reported on report dated 6/26/00 entry based on one inspection during the day. Later found out that crew and equipment worked whole shift instead of half shift. (Add the date of the supplemental entry and sign the entry.)

3-904F Tentative Agreements

Do not give copies of daily reports to the contractor's personnel. Do not permit the contractor's personnel to sign or initial daily reports. However, at the earliest possible

time, reach tentative agreement on extra work details. With the contractor's foreman, discuss labor, equipment, and materials at the end of each day or no later than the morning following the day that extra work was performed. Good communication at this time will help to prevent misunderstanding and arguments over details at a later date.

Use a district "tentative agreement" form if the form complies with district policy. On this form, tentatively agree to and list hours of labor and equipment used in extra work at force account for each contract change order each day. The form must state that the labor, equipment, and time worked are "acceptable for progress payment purposes." In this way, use of the form does not preclude subsequent audit and adjustment.

3-904G Interest on Payments

The specifications provide for interest to be paid on late progress payments, payments after acceptance, extra work payments, and claim payments.

Keep a log of the dates when extra work bills are received, returned for correction, and resubmitted. In a timely manner, process all extra work bills, and fully document reasons for returning or not paying extra work bills.

Make any necessary interest payments by contract change order as adjustment in compensation at lump sum.

3-905 Adjustment of Overhead Costs

3-905 Adjustment of Overhead Costs

Section 9-1.08, "Adjustment of Overhead Costs," of the *Standard Specifications*, provides for an adjustment in compensation. Make the adjustment when the final estimate is less than 90 percent of the original total bid price. Prepare a contract change order to be unilaterally approved in the district. Make the payment for the adjustment in the same manner as for any other adjustment in compensation.

The following is an example of a calculation to determine an overhead adjustment:

Example:	
Contractor's original bid (including mobilization)	$100,000
Ninety percent of Contractor's bid	$ 90,000
Final Estimate of total work	
(including mobilization, extra work,	
and less permanent deductions)	$ 85,000
Difference	$ 5,000
Adjustment of Overhead Costs	$ 500
(10 percent of difference)	

3-906 Stop Notice

3-906 Stop Notice

Refer to the Division of Accounting Services Disbursing Office all inquiries regarding bills for labor, material, or equipment rental not paid by Caltrans' contractor. Detailed information for payments and stop notice contacts can be found on the Division of Accounting Services "Contractor Payments and Information" web page at

http://www.dot.ca.gov/hq/asc/oap/payments/

3-907 Partial Payments

3-907 Partial Payments

Section 9-1.06, "Partial Payments," of the *Standard Specifications* requires Caltrans to make an estimate of work completed each month. Such estimates are designated as progress pay estimates. Each progress pay estimate must include payment for work completed up to and including the 20th day of the month. Include force account work, for which timely submittal of extra work bills has been made, and include other extra work or adjustment of compensation billings for which work has been performed. Billings for extra work at agreed price and adjustments of compensation are completed by the resident engineer by filling out Form CEM 4902, "Extra Work Bill (Short Form)," and submitting them for processing.

Resident engineers must transmit to the district construction office the documents and information required to prepare progress payment vouchers. The last documents must be in the district office no later than the date established by the district (usually no later than the end of the first working day after the 20th of each month).

District construction must arrange a schedule with the Division of Construction that will accommodate the Division of Accounting Services.

A monthly estimate and payment must be made if any amount of money is due the contractor.

Show all quantities submitted for payment on source documents. Typically Form CEM-4801, "Quantity Calculations," is used for this purpose. The estimate must reflect the totals on the source documents. A source document is defined as the basic document executed to record or calculate quantities, percentages of lump sums, or extra work for payment. See Section 3-903C, "Source Documents," for a discussion of source documents. An example of a source document (quantity calculation sheet) is shown below.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

QUANTITY CALCULATIONS

CEM-4801 (REV 11/1992) CT# 7541-3520-0

SHEET OF

JOB STAMP	ITEM	FILE NO.
07-1381U4 07-LA-210-47.5/57.3 Fed. No.: None	8 Temp. Railing (Type K)	48-8-2
	LOCATION: Ramp 3	SEGREGATION: YES ☐ NO ☐
	CALC. BY: I.M. Engineer	DATE
	CHK. BY: U.R. Wright	DATE

Field Measurement: ✓

Field Counted:

Final Pay Item:

Estimated Quantity: 450

Unit of Measure: meter

Unit Price: $20.00

75%= 337.5

125%= 562.5

Remarks or Other Calculations:

152.4 meters placed on 5-03-01 at Maple St. onramp ✓

Material Inspection/Release: Certificates of compliance obtained on 4-29-01.

PAY THIS ESTIMATE: 152.4 ✓

PREVIOUSLY PAID: 140.2 ✓

TOTAL TO DATE: 292.6 ✓

POSTED BY	DATE	POSTED TO
Office Engineer	05/19/01	CEM-6005, page 4, line 5

CEM4801

The quantity shown on the estimate for a contract item must agree with the sum of the quantities on all of the source documents to date for that item.

The resident engineer is responsible for the accuracy of a progress pay estimate. By approval, the resident engineer verifies correctness of the quantities and that the data submitted conforms to the policies of Caltrans. All entries on Form CEM 6004, "Contract Transactions Input," must be checked by other construction personnel for errors such as transposition and wrong numbers.

The resident engineer must review and approve each monthly estimate before district construction office staff can process it for payment. To expedite handling, the resident engineer need not sign the estimate itself to indicate approval. Approval may be by telephone. Confirm telephone approval by sending a memo or a "pre-verification of pay estimate" form letter to the district construction office.

See Section 5-103, "The Contract Administration System (CAS)," of this manual for technical details on the production of estimates.

3-907A Contract Items

Include all contract item work that is completed satisfactorily in accordance with the contract in partial payments.

Do not include for partial payment preparatory or organizational work such as assembling equipment, shop work, falsework, forming, or crushing or stockpiling of aggregate (unless provided for in the special provisions). Do not pay for material placed or installed for which the required evidence of acceptability (Form TL-0029, "Report of Inspection of Material," Form TL-0624, "Inspection Release Tag," Certificate of Compliance, or acceptance tests) has not been obtained.

For items bid on a unit basis, include in progress payments work that is substantially complete. Withhold a sufficient number of units to cover the value of the incomplete incidental work. In each case, a source document must be on file showing the details of the quantity's determination.

Reference to intermediate source documents items bid on a unit basis with a fixed final pay quantity, such as Structure Concrete (bridge) and Bar Reinforcing Steel (bridge), to show how partial payment was estimated. Withhold units of work to cover the value of incomplete incidental work. Base withheld amount on a force account analysis of the remaining incidental work.

The following examples are listed to illustrate the procedure:

1. Mobilization item

   The Contract Administrative System (CAS) will automatically calculate and enter partial payments for the item, "Mobilization."

2. Maximum Value Items

   Handle items for which maximum payment is limited until after a time fixed in the contract as follows:

   a. Include on the estimate the quantities completed in the same manner as for any other contract item. The quantity will be extended at the bid price and added to the total of work done.

   b. The system will make a deduction for any overbid.

   c. The system will return the deduction at the time set forth in the contract.

3. Roadway Excavation

   In normal situations material is excavated, hauled, placed in final position in embankment and compacted, but slope finishing is not done. This is considered incidental work and a quantity may be withheld to cover the value of the work remaining.

4. Aggregate for Subbase and Base

   Material may be produced, hauled, placed, and compacted, but final trimming to tolerance has not been performed. This is incidental work and a quantity may be withheld to cover the value.

5. Portland Cement Concrete Pavement

   Concrete may be in place and cured but not ground to meet surface tolerance. Grinding is incidental work and units may be withheld to cover the estimated cost.

6. Sewers and Irrigation Systems

   Pipe may be placed and backfilled but not tested. Withhold units to cover this work.

7. Fence

   Posts and wire or mesh may be in place and securely fastened but bracing wires not completed. Withhold units to cover this incidental work.

8. Structure Concrete (Final Pay Quantity)

   Base payment on the estimated proportionate number of units of the final pay quantity, which are in place. When structure concrete has been placed but items such as removing forms and falsework, curing, finishing, and other similar items have not been completed, withhold a number of units sufficient to cover the cost of this work.

9. Bar Reinforcing Steel

   Pay for bar reinforcing steel that is complete in place in the forms. It does not have to be encased in concrete before payment is made.

10. Structural Steel (Final Pay Quantity)

    Steel placed is paid by units erected and in place. Withhold units to cover incidental work such as additional bolting and welding.

For work that includes an item for “furnishing”, make no payment for “furnishing” until all contract requirements have been met, including acceptability of the material and delivery to the project. However, payment may be made for materials on hand, as covered below, for items that qualify and are listed in the special provisions. See the *Bridge Construction Records and Procedures Manual* for additional instructions.

For lump sum items, pay a percentage of the lump sum bid price as work progresses toward completion. The ratio of the number of working days an item of work has been in progress divided by the estimated total number of working days required to complete the item work may be used for this calculation. However, the resident engineer should be aware that such a simplified method might not actually reflect the value of the work completed. Reach an equitable agreement with the contractor for the basis of determining progress payments on lump sum items.

If any work or material on hand paid for on a previous monthly estimate loses value through loss, damage, or failure to function, deduct units representing the lost value from the following monthly estimate. Another example is storm damage requiring repair or replacement in accordance with Section 7-1.16, "Contractor's Responsibility for the Work and Materials," of the *Standard Specifications*.

Do not pay for item work added by change order until the change order is approved. However, payment for contract item overruns that are not the result of a change in the contract may be included in the monthly estimate.

3-907B Adjustments in Compensation

Do not pay for adjustments in compensation until change orders authorizing the adjustments have been approved.

If you anticipate that adjustments in compensation in accordance with Sections 4-1.03B, "Increased or Decreased Quantities," or Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications* will result in decreases in final payment, withhold an amount sufficient to cover the value of the decrease.

3-907C Extra Work

Do not pay for extra work until the contract change order is approved.

3-907D Materials on Hand

Pay for acceptable materials on hand provided that all specified conditions have been met. Follow the procedure described below:

- Give the contractor Form CEM-5101, "Request for Payment for Materials on Hand."
- The contractor must initiate payment by submitting a properly completed Form CEM-5101 in duplicate. Make no payment for any material if the contractor has not requested payment on the state-furnished form. The contractor must submit a request one week before the end of the estimate period for each estimate. Each request must represent the current status of materials on hand at the time the request is made. Do not honor a request if it does not represent the actual amount on hand.
- Upon receipt of a request for payment for materials on hand, the resident engineer must check it to determine that it is filled out properly, includes only eligible material listed in the special provisions, and that the contractor attached evidence of purchase. When the contractor's supporting evidence of purchase shows that a discount has been allowed, reduce the payment for materials on hand by the amount of the discount.
- Before processing a materials on hand request, inspect all materials for acceptability. Materials must have a Certificate of Compliance or Form TL-0029, "Report of Inspection of Material." The TL-0029 is evidence that the material was inspected at the source. In general, accept only completely fabricated units, ready for installation on the project with the following exceptions:

    1. Structural Steel. Structural steel that is used in steel structures as described in Section 55, "Structural Steel," of the *Standard Specifications* may be considered acceptable as raw material. However, pay for such material as raw material only until shop fabrication of a usable member (such as a girder or other shape ready for shipment to the jobsite) is 100 percent complete. After shop fabrication is complete, the estimated fabricated value may be paid, subject to other specified restrictions and administrative guidelines.

2. Sign Structures. Structural steel that is used in overhead sign structures as described in Section 56, "Signs," of the *Standard Specifications* may be considered acceptable as raw material. However, pay for such material as raw material only, until shop fabrication of a usable member (such as a sign frame or other member) is 100 percent complete. After shop fabrication is complete, pay for the estimated fabricated value, subject to other specified restrictions and administrative guidelines.

- Verify proper storage of materials listed on Form CEM-5101 in accordance with the following procedures:

3-907D (1) Materials at the Project

For all valid requests for material located at or near the project, determine whether the materials are stored in conformance with the contract. To conform to this requirement, the contractor may have to store materials in fenced areas with locked gates, in locked warehouses or in areas where it is improbable that materials would be lost from any cause. In addition to having controlled storage, the contractor is required by the *Standard Specifications* to provide proper storage and handling so that the materials do not become damaged. Call any indication of improper storage to the contractor's attention. Withhold payment for materials on hand until the materials are properly stored.

Do not pay for material accepted on the basis of certificates of compliance until such certificates have been received.

The resident engineer or an assistant resident engineer must review Form CEM-5101 to verify that the request is acceptable.

3-907D (2) Materials Not at the Project

For materials not delivered to the jobsite, obtain evidence and establish the fact of purchase, proper storage, acceptability, accessibility and other factors. The Office of Materials Engineering and Testing Services (METS) maintains representatives in the major industrial areas and provides inspection in all other areas for this purpose. The following is the procedure:

- If it is not practical for the resident engineer or assistant resident engineers to verify quantity, quality, location and proper storage, send the duplicate copy of the Form CEM-5101 to METS.

- Upon receipt of Form CEM-5101, METS will notify the appropriate inspection office or offices immediately. The METS representative will notify the resident engineer directly by use of Form TL-0649, "Inspector's Report of Material on Hand," or TL-6037, "Fabrication Progress Report," that the material has been inspected and that it is in acceptable condition and properly stored. METS will use Form TL-6037, for structural steel, precast prestressed concrete members, or sign structures. For other products, METS will use Form TL-0649.

METS may also indicate on its correspondence, the percent complete of shop fabrication on various structural components. This figure is given for the purpose of reporting progress on the affected items. Do not use it to increase payment for materials on hand during fabrication.

- Upon receipt of the CEM-5101 and the above verification, the resident engineer can approve the partial payment. The contractor must submit a new CEM-5101

for each estimate, and the above procedure must be followed. However, it is possible METS may not be able to respond in time for payment on the estimate. METS gives priority to new or changed requests. Therefore, for requests that have not changed since a previous submittal, resident engineers may approve subsequent payments in the absence of any METS reports to the contrary.

On the monthly progress pay estimate, enter the total value of acceptable material as material on site regardless of storage location.

The maximum payment for materials on hand should be such that, when the estimated placing and other remaining costs of the work are added, the contract price is not exceeded. The purpose of this is to prevent payment of more than the contract price for the materials and to leave sufficient funds in the item to complete the work.

3-908 Deductions

3-908 Deductions

Deductions (as opposed to retentions) are those amounts held back for specific purposes. The resident engineer must identify, initiate, and control all deductions.

Make a deduction from payment to the contractor as soon as the liability for the event requiring a deduction has been determined. It is preferable to base deductions on known amounts resulting from agreements or actual billings, but, if necessary, they can be estimated.

Resident engineers must keep source documents and summary sheets in the appropriate contract records to cover all deductions. In the absence of any information to the contrary, the Contract Administrative System (CAS) will carry deductions forward from the previous month.

Whenever the contractor's progress is unsatisfactory, and the project has progressed to a point where a reasonably accurate estimate of possible liquidated damages can be made, the resident engineer must deduct an amount sufficient to cover probable liquidated damages. Make the deduction in lieu of any retention for unsatisfactory progress. To prevent the retention, check "Override Unsatisfactory Progress" on the CEM-6001. Enter the amount and description of deductions on Form CEM-6001, "Project Record-Estimate Request."

3-909 Retentions

3-909 Retentions

Retentions are made in accordance with the terms of the contract. The Contract Administrative System (CAS) will calculate and make the retention, including any retention for unsatisfactory progress, without any specific action by construction personnel. On any estimate that shows satisfactory progress, the system will release all retentions previously made for unsatisfactory progress.

Occasionally a contract will contain a nonstandard format for contract time or other circumstance resulting in satisfactory progress even though it is mathematically unsatisfactory. When this situation occurs, the resident engineer must waive the retention for unsatisfactory progress and document the reason for doing so. To waive the retention, check "Override Unsatisfactory Progress" on Form CEM-6001, "Project Record-Estimate Request."

In general, the retention for unsatisfactory progress should be waived only for landscape projects or on other projects only after a corrected entry has been made for "percent time elapsed" as covered below.

If the contractor requests a reduction of retention after 95 percent of the work has been completed, forward the written request to the disbursing officer in the Division of Accounting Services. CAS will reduce the retention when all the requirements specified in Section 9-1.06, "Partial Payments," of the *Standard Specifications,* have been met.

3-909A Calculating Progress - Projects with Single Time

Satisfactory or unsatisfactory progress is usually the determining factor for retentions. Such progress is determined by comparing the contractor's actual progress with the curve on Form CEM-2601, "Construction Progress Chart." This requires calculation of the percent of work completed and the percent of time elapsed. If the plot of these percentages falls on or above the curve on Form CEM-2601, progress is considered satisfactory. Otherwise, it is considered unsatisfactory except under extenuating circumstances.

The percent of work completed (except on landscape projects with Type 1 plant establishment) is determined by dividing the amount on the line entitled "Total Work Completed" on the "Project Record Estimate" by the "Authorized Final Cost" on the "Project Status". This percentage is calculated (except on projects with Type 1 plant establishment) by CAS.

CAS computes the percent of contract time elapsed by dividing the number of working days elapsed to the date of the progress estimate, by the original working days specified in the contract plus "Total time extension days approved to date (CCO plus other)," on Form CEM- 2701, "Weekly Statement of Working Days."

Occasionally the resident engineer has information indicating that the percent of time elapsed is different from that which will be calculated by CAS. The usual reason for this is that pending time extensions have not yet been approved and entered into the system. The percent of time elapsed can be calculated using the anticipated time extension in the formula in the preceding paragraph. The resident engineer must document the calculated percent of time elapsed as well as the reasons therefore. Enter the calculated percent of time elapsed in the appropriate place on Form CEM-6001, "Project Record-Estimate Request." CAS will calculate satisfactory or unsatisfactory progress based on this figure.

3-909B Calculating Progress for Landscape Projects

See Section 20-4.08, "Plant Establishment Work," of the *Standard Specification,* and Section 4-2003C (8), "Plant Establishment Work," of the *Construction Manual,* for specifications and administrative guidelines for plant establishment time requirements. For projects with Type 2 plant establishment, the percent of time elapsed and percent of work completed is determined in the normal manner as described above. For projects with Type 1 plant establishment, compute the percent of time elapsed and the percent of work completed as follows for the periods prior to the start of plant establishment.

Determine the percent of work completed by dividing the value of work accomplished by the authorized contract amount minus the authorized plant-establishment work.

$$\% \text{ Complete} = \frac{\$ \text{ Value Completed Work}}{(\$ \text{ Total Auth. Contract Amt.} - \$ \text{ Plant-estab. Work})}$$

Determine the percent of time elapsed by dividing the number of working days elapsed to the time of the estimate Form CEM-2701 by the total contract time limit plus "Total time extension days approved to date (CCO plus other)" on Form CEM-2701 and minus the length of the plant-establishment period.

$$\% \text{ Time} = \frac{\text{(Working Days Elapsed)}}{\text{(Orig. Cont. Time + Time Ext. to date - Plant-estab. Period)}}$$

Compare these two percentages to the curve on Form CEM-2601, "Construction Progress Chart". If progress is satisfactory, check the "Override Unsatisfactory Progress" on Form CEM-6001, "Project Record-Estimate Request."

After the start of Type 1 plant-establishment, the resident engineer will decide if the progress is satisfactory. In general, consider progress considered satisfactory if the contractor entered the plant-establishment period on time and carries out plant-establishment work on time. Progress will be considered unsatisfactory if there will be an overrun in contract time due to a delayed start of Type 1 plant establishment.

3-910 Payment After Acceptance

3-910 Payment After Acceptance

Caltrans policy is to make final payment as soon as possible after the contract has been accepted and the contractor has submitted all documents the resident engineer has requested.

Any estimate covering a payment after the contract has been accepted will be identified either as "after acceptance," "semifinal," or "final."

Section 5-4, "Disputes," of the *Construction Manual* (manual) lists the timeline for the payment steps to be completed after the acceptance process.

3-911 Payment of a Progress Estimate After Contract Acceptance

3-911 Payment of a Progress Estimate After Contract Acceptance

A progress payment after acceptance must adhere to Section 9-1.07A, "Payment Prior to Proposed Final Estimate," of the *Standard Specifications*. The purpose of this type of progress payment is to release all money due the contractor that exceeds any amounts retained under the contract. When determining amounts to be paid or deducted for this type of estimate, the following applies:

1. Include payment for the following:

- Any work completed since the previous estimate
- Any errors that may have been discovered and corrected
- Any labor compliance deficiencies that have been cleared

2. Include payment for any overbids on maximum value items, including the mobilization item. You do not need to take any additional action for this step.

3. When delinquent or inadequate payrolls exist, make a deduction from the payment. The deduction will be in the same amount as for any progress estimate. See Section 8-1, "Labor Compliance," of this manual.

4. When the contractor has failed to correct deficiencies in its equal employment opportunity program, make a deduction from the payment. These deficiencies include failure to submit the following:

- Form CEM-2402S, "Final Report—Utilization of Disabled Veterans Business Enterprises First-Tier Subcontractors," on state funded projects
- Form CEM-2402F, "Final Report—Utilization of Disadvantaged Business Enterprises," on federal funded projects

The deductions will be in the same amount as for any progress estimate. See Section 8-2, "Equal Employment Opportunity," and Section 8-3, "Disadvantaged Business," of this manual.

5. To cover any outstanding documents required under this contract, make a deduction from the payment. These outstanding documents include the following:

- Reduced prints of working drawings
- Outstanding payrolls that are not yet delinquent
- Federal Form FHWA-47M, "Statement of Materials and Labor Used by Contractors on Highway Construction Involving Federal Funds"
- Or any information upon which to base the proposed final estimate, such as adjustments of contract unit prices

The deduction, regardless of the number of outstanding items, will be the lesser of 5 percent of the "Subtotal Amount Earned Without Mobilization" or $10,000.

In addition to the steps listed above for determining amounts to be paid or deducted for a progress estimate after contract acceptance, the resident engineer must also do the following:

1. Notify the district of what deductions are applicable.
2. Compound the deductions when a combination of the following situations, which were outlined above, occur:

- The contractor has delinquent or inadequate payrolls.
- The contractor failed to correct deficiencies in its equal employment opportunity program.
- The contractor failed to honor requirements related to disadvantaged business enterprises.

3. Also compound permanent deductions. Permanent deductions include items such as material royalties, railroad flagging charges, material testing, out-of-specification material, or restaking charges. Also considered permanent are deductions for anticipated liquidated damages. (When warranted, anticipated liquidated damages can be made on progress estimates. However, anticipated liquidated deductions will need to be made permanent on the after-acceptance estimate. To do so, release anticipated liquidated damages; then take actual liquidated damages under liquidated damages on the after-acceptance estimate.)

4. When you make deductions for outstanding items, advise the contractor in writing of the specific missing items and that they will result in a delay of final payment.

5. Before processing an after-acceptance estimate, run the following two reports, "Status of CCO," and "CCO master listing." These reports will show any adjustment of compensation credit or deferred time not yet taken.

3-912 Proposed Final Estimate

3-912 Proposed Final Estimate

The purpose of the proposed final estimate is to obtain formal agreement regarding final payment. For this type of estimate, follow these guidelines:

- Submit the proposed final estimate to the contractor within the time frame outlined in Section 5-4, "Disputes," of this manual.
- Soon after the contract is accepted, meet with the contractor to discuss submitting the required information to complete the contract. If the contractor does not submit the required data within four weeks after acceptance, you must notify the contractor in writing that Caltrans will issue the proposed final estimate and deduct the appropriate amount.
- Before the processing of the proposed final estimate, ensure all extra work bills submitted by the contractor are processed and ready for payment. Ensure the estimate's issuance is not delayed for force account billings that remain outstanding.
- If the contractor has not submitted required information in a timely manner, Section 5-4, of this manual dictates that the proposed final estimate must still be issued. In this situation, the following guidelines apply:

  1. Any time before a proposed final estimate is issued, the district may exercise an option described in Section 9-1.03C, "Records," of the *Standard Specifications*. This section identifies the conditions under which Caltrans may establish the cost of materials when valid copies of vendors' invoices are not forthcoming. When the district decides to establish such costs, use the following procedure:

     a. If the established cost is necessary to determine compensation, complete the pending contract change order, and have it unilaterally approved. To determine compensation, refer to Section 4-1.03B, "Work Performed by Special Forces or Other Special Services," or Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications*.

     b. If the established cost is necessary to make force account payment on an existing contract change order, include this established cost as a lump sum payment on a supplemental contract change order. Also, unilaterally approve this supplemental contract change order.

  2. On the proposed final estimate, you may list (in the amount the district determines to be payable) any force account billings that have not been paid because of a dispute. Upon return of the proposed final estimate, the contractor must reiterate the disputed extra work, which must be handled like any other claim. Do not list in the proposed final estimate any force

account billings the contractor has not yet submitted. It is the contractor's responsibility to either submit these bills before the proposed final estimate or list them as exceptions to the proposed final estimate.

3. The district will show the required deduction on the proposed final estimate in the same manner as for any other deduction when the contractor has the following outstanding items:

   a. Delinquent or inadequate payrolls

   b. Deficiencies in its equal employment opportunity program

   c. Violations of requirements related to disadvantaged business enterprises

   (These items are also described under the heading "Payment of a Progress Estimate After Contract Acceptance" in this section.) When such deductions are shown, include a statement similar to the following on the letter that accompanies the proposed final estimate: "The amount of $_____, which has been deducted for nonsubmittal of documents required by the contract, will be paid when all such documents have been received."

- Submit Form CEM-6001, "Project Record-Estimate Request," to the district office with the proposed final estimate box checked to initiate the proposed final estimate.
- The proposed final estimate is to be prepared and sent to the contractor by the district construction office. It should include the following:

  1. A letter transmitting the proposed final estimate to the contractor. This letter should include the statements shown in Example 1, at the end of this section.
  2. A form for the contractor's acceptance of the amounts listed in this estimate. Ensure the form contains wording similar to the wording in Example 2, at the end of this section.
  3. The proposed final estimate report showing the status of item payments generated by the Contract Administration System (CAS) along with the "schedule of extra work" and "schedule of deductions" reports. Samples of these reports are shown in Examples 3 through 7, at the end of this section.
  4. If deductions for items such as staking charges, laboratory charges, railroad flagging charges, and overruns of contract time are not finalized and shown on the reports, a list of their estimated maximum amounts must be attached.

- Use separate correspondence, not the proposed final estimate, for funds withheld for labor violations and wage restitution (as opposed to outstanding or inadequate payrolls).
- When money is due on the proposed final estimate, ensure the semifinal estimate processed immediately after reflects the same "totals" as the proposed final estimate. If you follow this approach, the contractor will submit claims based on our "statement of total amount earned," rather than some "revised" number.

- To establish the beginning of the 30 days during which the contractor may submit written claims, send the proposed final estimate by certified mail, "return receipt requested," or overnight delivery.
- From the issuance of the proposed final estimate to the receipt of the contractor's response, do not enter into any negotiations, written or verbal, concerning the proposed final estimate or potential claims, except as described in the next bullet. During this time, negotiating or communicating with the contractor (or issuing contract change orders) may negate the finality of the proposed final estimate. If the finality is negated, the contractor may have 30 days from the most recent communication to respond.
- If you discover an error that requires a decrease in a quantity, send a letter to the contractor stating the discovery of an error, and specify the item and amount of the change. Also, state that the error will be addressed after the contractor returns the proposed final estimate. If the contractor discovers and brings to your attention any errors or discrepancies, handle this situation through separate correspondence covering only the affected items. For example, if the contractor disputes the quantity of an item, send a letter to the contractor stating that the item must be listed as an exception to the proposed final estimate. In the letter, also state that the item will be analyzed after the return of the proposed final estimate and exceptions, also known as the "Acceptance Statement."
- When the contractor returns the "Acceptance Statement," proceed as follows:
  1. If the returned Acceptance Statement has no exceptions (claims) and all documents required under the contract have been received, prepare and process the final estimate.
  2. If the returned Acceptance Statement has no exceptions, but some documents are still outstanding, continue pressing the contractor, in writing, for the missing documents. If amounts due the contractor exceed the deductions by more than $300, prepare and process a semifinal estimate.
  3. If the documents have not been received in approximately 60 days, request advice from the construction field coordinator about further action.
  4. If the Acceptance Statement is returned with exceptions, initiate the claims procedure as outlined in Section 5-4, "Disputes," of this manual.
- When the Acceptance Statement is not returned within the specified 30 days, ensure it has not been lost in transit and then proceed as follows:
  1. If all documents have been received, prepare and process the final estimate.
  2. If some documents are still outstanding, request advice from the construction field coordinator about further action.
  3. If the contractor includes in the Acceptance Statement any claim that is postmarked or hand-delivered more than 30 days after the date the contractor received the proposed final estimate, the claim is considered untimely and *will not* be processed. On a hand-delivered claim, record the date the claim arrived, who delivered it, and who received it. Retain the envelope for a claim that arrived through the mail to establish the date the claim was sent. Inform the contractor of the late filing by using a letter worded in a similar way to the letter below. This notification will constitute the final administrative action on a late claim.

Notification to Inform the Contractor of a Late Filing:

Contractor _____,

The statement of claim included in your letter dated _____, was submitted to us more than 30 days after you received copies of the proposed final estimate for Contract No. _____, (County Route and kilopost).

A final estimate is, therefore, being processed for issuance to you as provided in Section 9-1.07B, "Final Payment and Claims," of the *Standard Specifications.*

Sincerely,

District Construction Office

4. If the contractor includes claims with the return of the proposed final estimate, the district should immediately acknowledge the receipt of the claims by sending a written statement similar to the following:

Acknowledgement of the Receipt of Claims:

Your written statement of claims has been received. The engineer will base the determination of your claims upon the investigation of your statement.

The investigation of your claim statement will begin immediately. If it is determined that additional information is required, you must furnish it within 15 days of the request in accordance with Section 9-1.07B, "Final Payment and Claims," of the *Standard Specifications*. You may request in writing an extension of time to a specific date. Our purpose is to provide you with the engineer's final determination on claims in the minimum possible time, consistent with the assurance that all the facts are available for consideration.

5. If the initially submitted claim statement is obviously deficient in information, use a paragraph similar to the following in lieu of the second paragraph above :

Notification of Deficiency of Information:
Your initial submission appears to be deficient as to the following: [Select appropriate item or items.]

1. Statement of contractual basis for claim

2. Information as to compliance with Section 4-1.03A, Section 9-1.04 of the *Standard Specifications*, or both

3. Breakdown of amount claimed due

4. Other, as applicable

Please submit any further information you wish to have considered by [date, approximately 15 days after the contractor will receive the letter]. If you will require additional time to prepare your supplementary statement, please request an extension in writing specifying the date to which the extension is requested. The engineer intends to make the final determination on claim matters in the minimum possible time, consistent with the assurance that all the facts are available for consideration.

6. Examine claims expeditiously. For detailed instructions, refer to Section 5-4, “Disputes,” of this manual.

3-913 Semifinal Estimate

3-913 Semifinal Estimate

A semifinal estimate is any estimate prepared after issuing the proposed final estimate and before preparing the final estimate. The primary purpose of a semifinal estimate is to make timely payment for all nondisputed items that have not been paid on a previous estimate. However, semifinal estimates can also be issued to make payment if some, but not all claims, have been resolved.

The proposed final estimate need not show a zero balance for money owed to the contractor. If the proposed final estimate does identify money owed to the contractor, immediately run a semifinal estimate after the proposed final estimate. Do not wait for any response from the contractor to the proposed final estimate. Do not issue any other estimates until 30 days after issuing the proposed final estimate.

Normally, use the same procedures to issue a semifinal estimate as those to issue a progress estimate.

3-914 Final Estimate

3-914 Final Estimate

Submit a final estimate only after one of the following conditions has been met:

- The contractor has submitted all required documents and complete agreement on payment has been reached.
- The district directors’ determination of claim has been issued.
- The contractor does not respond to the proposed final estimate in the specified time but has submitted all required documents.
- Or, the district has been advised by the construction field coordinator to proceed.

As soon as the district approves the final estimate, it must use a transmittal letter to send it to the contractor. The letter must state the following: “Submitted herewith in accordance with Section 9-1.07B of the *Standard Specifications* is a copy of the final estimate for your Contract No. .”

A copy of the transmittal letter is to be sent to the resident engineer to be retained in the project files.

The district transmits only the final estimate because the disbursing office of the Division of Accounting Services will mail to the contractor the corresponding copy of the progress payment voucher.

<u>3-914A Material to Submit</u>
Before payment of a final estimate, the Division of Construction’s progress pay staff must ensure that administrative details have been completed. For this purpose, the district must forward the following data before or with all final estimates:

- Submit the proposed final estimate as originally submitted to the contractor, including transmittal letters.
- Submit the Acceptance Statement as returned by the contractor. If the contractor has refused to sign the statement, submit it with an explanation of the contractor’s refusal.

- When required by the special provisions, submit the original and two copies of Federal Form FHWA-47M, “Statement of Materials and Labor Used by Contractors on Highway Construction Involving Federal Funds”.
- Submit a transmittal letter containing (but not limited to) the following:

  1. A list of the forms and attachments being transmitted or an explanation as to why a form or attachment is missing. Include letters from the Division of Construction authorizing the submittal of the final estimate without certain documents and stating the action taken or to be taken as a result of the missing documents.
  2. A statement about the use of materials agreements. If there are no materials agreements, state this.
  3. A statement that reduced prints of all shop drawings for highway bridges and railroad bridges have been received from the contractor. If such drawings are not required, please state so.
  4. Correspondence or documents explaining or authorizing the differences between the proposed final estimate and the final estimate.
  5. The original and two copies of Form CEM-2402S, “Final Report—Utilization of Disabled Veterans Business Enterprises (DVBE) State Funded Projects”, or Form CEM-2402F, “Final Report—Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors” (federally funded projects).

Example 1: Form letter to Use When Submitting Proposed Final Estimate to the Contractor

Subject: Proposed Final Estimate

In accordance with the provisions of Section 9-1.07B, "Final Payment and Claims," of the *Standard Specifications*, attached (in triplicate) is a

proposed final estimate for _____ _____
(Contract) (Dist. Co. Rte. K.P.)

Please review the proposed final estimate and, if satisfactory, indicate your approval in the space provided on the attached Acceptance Statement. Return three copies of the Acceptance Statement to this office. One copy is for your files.

Please note the following portion of Section 9-1.07B of the *Standard Specifications,* which states:

"The contractor shall submit written approval of the proposed final estimate or a written statement of all claims arising under or by virtue of the contract so that the engineer receives the written approval or statement of claims no later than close of business of the thirtieth day after receiving the proposed final estimate. If the thirtieth day falls on a Saturday, Sunday or legal holiday, then receipt of the written approval or statement of claims by the engineer shall not be later than close of business of the next business day. No claim will be considered that was not included in the written statement of claims, nor will any claim be allowed as to which a notice or protest is required under the provisions in Sections 4-1.03, 'Changes,' 8-1.06, 'Time of Completion,' 8-1.07, 'Liquidated Damages,' 5-1.116, 'Differing Site Conditions,' 8-1.10, 'Utility and Non-Highway Facilities,' and 9-1.04, 'Notice of Potential Claim,' unless the contractor has complied with the notice or protest requirements in those sections."

Your promptness in returning the signed copies, indicating your approval, will expedite payment of the final estimate. Alternatively, a signed qualified approval by reason of a written statement of claims will expedite payment of a semifinal estimate. A statement of claims must include a notarized certificate containing the language required in Section 9-1.07B of the *Standard Specifications*.

If claims are submitted in connection with this contract, you will be expected to comply fully with the fourth paragraph of Section 9-1.07B of the *Standard Specifications*. The engineer will base the determination of claims upon the investigation of your statement, in which you will be expected to present your position fully as to the contractual basis of the claim, compliance with contract requirements such as Section 4-1.03A, "Procedure and Protest," or Section 9-1.04, "Notice of Potential Claims" of the *Standard Specifications*, if applicable, a breakdown of the total amount claimed, and all other information you consider to be in support of your claim.

As further provided in Section 9-1.07B of the *Standard Specifications*, in case neither approval nor a statement of claims is received within 30 days, a final estimate in the amount of this proposed final estimate will be issued. Your date of receipt of this proposed final estimate establishes the beginning of the specified 30 days.

Sincerely,

District Construction Office

Example 2: Acceptance Statement Form

Subject: Acceptance Statement

Attachment to transmittal letter

dated_____ Contract Identification:

I have examined the quantities of contract items and amounts indicated as payment for extra work and the deductions on the proposed final estimated dated _____. I agree to accept the total of $_____ as indicated, as the total amount earned for all work performed on the above contract, except as may be indicated below.

_____
Contractor

Exceptions (check one)

_____
By

[ ] None
[ ] As indicated per attached letter dated_____.

_____
Title

_____
Date

Example 3: Sample of the Proposed Final Estimate

PROGRAM CAS145
DATE 01/02/01
TIME 02:40 PM
BID OPENING 02/08/00
R.E. NAME: ZINK, PHIL
LOCATION
03-PLA-65-13.4/14.7

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

P R O J E C T R E C O R D - E S T I M A T E

PROPOSED FINAL ESTIMATE

PAGE 1
03-441804
ESTIMATE NO. 06
WORK PERFORMED THROUGH 11/17/00
DATE OF THIS ESTIMATE 01/02/01

M & M ELECTRIC
1600 AUBURN BLVD
SACRAMENTO, CA 95815

IN PLACER COUNTY IN LINCOLN FROM
0.1 KM NORTH OF SIXTH STREET TO
0.2 KM NORTH OF SEVENTH STREET

FED. AID NO. ACST-P065(60)E ,P-P065(60)E

SIGNALS AND LIGHTING

ITEM NO.	ITEM DESCRIPTION	UNIT	CONTRACT PRICES	ORIGINAL AUTH. AMT	THIS ESTIMATE QUANTITY	THIS ESTIMATE $ AMOUNT	TOTAL ESTIMATE QUANTITY	TOTAL ESTIMATE $ AMOUNT
001 (S)	CONSTRUCTION AREA SIGNS	LS	1,050.0000	1,050.00			1.000	1,050.00
002 (S)	TRAFFIC CONTROL SYSTEM	LS	2,500.0000	2,500.00			1.000	2,500.00
003 (S)	PORTABLE CHANGEABLE MESSAGE SIGN	EA	3,000.0000	6,000.00			2.000	6,000.00
004	REMOVE ROADSIDE SIGN	EA	75.0000	225.00			3.000	225.00
005 (S)	COLD PLANE ASPHALT CONCRETE PAVEMENT	M2	5.0000	8,400.00			1,683.000	8,415.00
006	REMOVE CONCRETE SIDEWALK AND DRIVEWAY	M3	1,500.0000	750.00			3.060	4,590.00
007	REMOVE CONCRETE (CURB AND GUTTER)	M3	1,500.0000	1,200.00			1.570	2,355.00
008 (S)	ROADWAY EXCAVATION	M3	1,000.0000	6,000.00			5.500	5,500.00
009 (S)	ASPHALT CONCRETE (TYPE A)	TONN	125.0000	875.00			4.580	572.50
010 (S)	ASPHALT CONCRETE (OPEN GRADED)	TONN	135.0000	8,235.00			79.240	10,697.40
011 (S)	PLACE ASPHALT CONCRETE (MISCELLANEOUS AREA)	M2	150.0000	2,100.00			13.520	2,028.00
012 (S)	CLASS 4 CONCRETE (BACKFILL)	M3	250.0000	650.00			0.900	225.00
013	ROADSIDE SIGN - ONE POST	EA	230.0000	230.00			1.000	230.00

Example 4: Sample of Project Record Estimate, Summary of Payment

PROGRAM CAS145
DATE 01/02/01
TIME 02:40 PM
BID OPENING 02/08/00
R.E. NAME: ZINK, PHIL

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

P R O J E C T R E C O R D - E S T I M A T E

PAGE 2
03-441804
ESTIMATE NO. 06
WORK PERFORMED THROUGH 11/17/00
DATE OF THIS ESTIMATE 01/02/01

ITEM NO.	ITEM DESCRIPTION	UNIT	CONTRACT PRICES	ORIGINAL AUTH. AMT	THIS ESTIMATE QUANTITY	THIS ESTIMATE $ AMOUNT	TOTAL ESTIMATE QUANTITY	TOTAL ESTIMATE $ AMOUNT
	SUBTOTAL CONTRACT ITEMS					0.00		124,938.82
	ADJUSTMENT OF COMPENSATION					0.00		0.00
	EXTRA WORK					0.00		4,613.30
	SUBTOTAL AMOUNT EARNED					0.00		129,552.12
	ORIGINAL CONTRACT AMOUNT			120,019.00				
	TOTAL WORK COMPLETED					0.00		129,552.12
	MATERIALS ON HAND ON SITE							0.00
	MATERIALS ON HAND ELSEWHERE							0.00
	DEDUCTIONS					15,000.00		0.00
	TOTAL					15,000.00		129,552.12

ITEMS FOR WHICH CONTRACT PRICE EXCEEDS MAXIMUM VALUE
N O N E

DATE APPROVED	CONTR DAYS	DATE WORK STARTED	BEGIN CONSTR	JOB COMPLETED ON	WORKING DAYS	WEATHER NON-WORKING DAYS	C.C.O. DAYS	OTHER DAYS	PERCENT COMPLETED	PERCENT TIME ELAPSED
03/29/00	30	07/17/00	06/27/00	11/17/00	76	24	0	0	100%	100%

ZINK, PHIL
RESIDENT ENGINEER

Example 5: Schedule B - Extra Work and Adjustment of Compensation

```
PROGRAM CAS145     E X T R A  W O R K  A N D  A D J U S T M E N T  C O M P E N S A T I O N
DATE 01/02/01            SCHEDULE B 01/02/01                                  PAGE NUMBER   1
TIME 02:40 PM                                                            CONTRACT NO.  03-441804
ZINK, PHIL                                                                   ESTIMATE NO:  6
-------------------------------------------------------------------------------------------------
 CCO  BRIEF                          ITEMS                                AMOUNT          AMOUNT
 NO.  DESCRIPTION                    AFFECTED            WORK TYPE        AUTHORIZED      EXPENDED
-------------------------------------------------------------------------------------------------

001  TRAFFIC CONTROL (FLAGGING)                    E.W. @ F.A.(+)          $500.00
                                                   E.W. @ U.P (+)        $5,995.00         $940.80
002  REPLACE B-3 CURB/REPLACE PCC  6,15,16                               $4,513.75
      ELEC FOUND
003  REPLACE VIHICLE SIGNAL                        E.W. @ F.A.(+)          $700.00
004  REPL SIGNAL POLE & ARM                        E.W. @ L.S.(+)        $2,830.00       $2,122.50
005  REPLACE PED PUSH BUTTONS &                    E.W. @ L.S.(+)        $1,550.00       $1,550.00
                                                                  ---> TOTAL AC =
                                                                  ---> TOTAL EW =        $4,613.30
```

Example 6: Schedule of Extra Work

```
PROGRAM CAS145   S C H E D U L E   O F   E X T R A   W O R K    PAGE NO.  1
DATE 01/02/01                                                    EST. NO.06
TIME 02:40 PM
R.E. NAME: ZINK, PHIL                                             03-441804
-------------------------------------------------------------------------------
CCO REPORT       REPORT TYPE OF WORK(+) WORK  BR CONTR
NO. NUMBER       AMOUNT PERFORMED   (-) DATE  WK RPT.NO C O M M E N T S
-------------------------------------------------------------------------------
*** THERE ARE NO EXTRA WORK PAYMENTS THIS ESTIMATE ***
```

Example 7: Schedule of Deductions

PROGRAM CAS145 S C H E D U L E O F D E D U C T I O N S PAGE NO. 1
DATE 01/02/01 EST. NO.06
TIME 02:40 PM
R.E. NAME: ZINK, PHIL 03-441804

DEDUCTION DESCRIPTION	AMOUNT	EST NO.	THIS ESTIMATE	TOTAL ESTIMATE
EQUAL EMPLOYMENT OPPORTUNITY				
MISSING PR-1391	-7,622.53	02		
RECEIVED FORM PR1391	7,622.53	03		
MISSING CEM 2402	-10,000.00	05		
CEM 2402	10,000.00	06		
			10,000.00	0.00
LABOR COMPLIANCE VIOLATION				
MISS P/R - RIOLO,O/O	-7,622.53	02		
MISSING PAYROLLS	-4,327.59	03		
MISSING PAYROLLS	-5,000.00	05		
RETURN EST #2, EST#3	11,950.12	05		
PAYROLLS	5,000.00	06		
			5,000.00	0.00
TOTAL DEDUCTIONS			15,000.00	0.00

Introduction

Introduction

4-001 Scope

4-001 Scope

Each section in this chapter of the *Construction Manual* (manual) corresponds to a section in the *Standard Specifications*. All sections in the *Standard Specifications* except the first nine "General Provisions" sections and four "Structures" sections are included here. The four "Structures" sections, 49, 50, 55, and 59, are covered in the *Bridge Construction Records and Procedures Manual*.

Each section in this chapter contains the following four parts:

- **General** briefly describes the work covered in the section.
- **Before Work Begins** describes the actions the resident engineers and assistant resident engineers must take before the contractor begins the construction work.
- **During the Course of Work** describes the actions the resident engineers and assistant resident engineers must take when the contractor is performing the work.
- **Measurement and Payment** provides guidelines for measuring and paying for the work covered in the section.

4-002 Purpose

4-002 Purpose

Even though each section in Chapter 4 closely follows the corresponding section in the *Standard Specifications*, the intent in this chapter is not to repeat or paraphrase the specifications, but to offer guidelines for action to ensure compliance with the specifications and to measure work done. Therefore, for resident engineers and assistant resident engineers, Chapter 4 provides guidelines for inspecting, measuring, and paying for contract item work.

For the most part, only the *Standard Specifications* are considered. Special provisions, superceding the *Standard Specifications*, will require actions different from or in addition to those described in these guidelines.

Assistant resident engineers are usually assigned some specific portion of contract work. The first duty in carrying out the assignment is to become thoroughly familiar with the contact plans, standard plans, special provisions, and standard specifications that apply to that particular work. This chapter of the manual does not substitute for and does not diminish the need to have a good understanding of the planned work and the specifications.

Section 10 Dust Control

Section 10
Dust Control

4-1001 General

4-1001
General

Under the terms of the project contract, the contractor must control dust. The contractor must maintain such control whether payment is included in the prices paid for the various items of work involved or whether payment is made separately.

4-1002 Before Work Begins

4-1002
Before Work Begins

During this preliminary inspection, take the following steps:

- Determine whether a planned method to control dust is included in the contractor's approved water pollution control plan.
- Whenever it is proposed to handle temporary traffic changes on an unpaved roadway, anticipate the necessity for dust control. See Section 4-17, "Watering," and Section 4-18, "Dust Palliative," in this *Construction Manual* for additional factors relating to dust control.

4-1003 During the Course of Work

4-1003
During the Course of Work

Notify and require corrective action whenever the contractor is not adequately controlling dust. In cases of neglect, work may be suspended under the resident engineer's authority, pursuant to Section 8-1.05, "Temporary Suspension of Work," of the *Standard Specifications*.

4-1004 Measurement and Payment

4-1004
Measurement and Payment

Pay for dust control as extra work only when public traffic has caused dust. In all other cases dust control is included in the various items of work involved.

Section 11 Mobilization

Section 11 Mobilization

4-1101 General

4-1101 General

Section 11-1.01 "Description," of the *Standard Specifications,* describes the work to be included in the lump sum contract item for mobilization.

4-1102 Before Work Begins

4-1102 Before Work Begins

The resident engineer does not need to do any preparatory work for the mobilization contract item.

4-1103 During the Course of Work

4-1103 During the Course of Work

Separate work chargeable to mobilization from other contract item work on daily reports. Exclude the cost of work covered under the mobilization contract item from contract item costs when making adjustments in accordance with Section 4-1.03, "Changes," of the *Standard Specifications.* The contract item for mobilization includes:

- Setting up the contractor's field offices, equipment yards, security fencing, and on-site materials processing plants.
- Grading access roads to offices, plants, and equipment yards.
- Acquiring utility services.
- Moving personnel, equipment, and supplies to the job site.

The contract item for mobilization does not include:

- Delivering materials to the job site. This work is paid for by the applicable contract item.
- Developing a water supply for contract work. See Section 17, "Watering," of the *Standard Specifications*.
- Furnishing and erecting signs. See Section 12-3.06, "Construction Area Signs," of the *Standard Specifications.*
- Grading for access to excavation areas. This work is normally covered under the roadway excavation contract item.
- Moving equipment and temporary structures off the site and removing excess material. See Section 4-1.02, "Final Cleaning Up," of the *Standard Specifications.*

4-1104 Measurement and Payment

4-1104 Measurement and Payment

The Contract Administration System (CAS) automatically makes progress payments for the mobilization contract item.

Section 12 Construction Area Traffic Control Devices

4-1201 General

4-1202 Before Work Begins

4-1202A Flagging
4-1202B Barricades
4-1202C Flashing Arrow Signs
4-1202D Portable Delineators
4-1202E Portable Flashing Beacons
4-1202F Construction Area Signs
4-1202G Channelizers
4-1202H Temporary Railing (Type K)
4-1202I Traffic Cones
4-1202J Portable Changeable Message Signs
4-1202K Temporary Crash Cushion Module
4-1202L Temporary Traffic Screen
4-1202M Temporary Signal System
4-1202N Traffic Plastic Drums
4-1202O Traffic Control System
4-1202O (1)
4-1202O (2)
4-1202O (3)

4-1203 During the Course of Work

4-1203A Flagging
4-1203B Barricades
4-1203C Flashing Arrow Signs
4-1203D Portable Delineators
4-1203E Portable Flashing Beacons
4-1203F Construction Area Signs
4-1203G Channelizers
4-1203H Temporary Railing (Type K)
4-1203I Traffic Cones
4-1203J Portable Changeable Message Signs
4-1203K Temporary Crash Cushion Module
4-1203L Temporary Traffic Screen

4-1203M Temporary Signal System
4-1203N Traffic Plastic Drums
4-1203O Traffic Control System
4-1203O (1) Field Adjustments
4-1203O (2) Placement Sequence and the Start of Work
4-1203O (3) Drive--Through Inspection
4-1203O (4) Maintenance
4-1203O (5) Reverse Operations Inside Closures

4-1204 Measurement and Payment

4-1204A Flagging
4-1204B Barricades
4-1204C Flashing Arrow Signs
4-1204D Portable Delineators
4-1204E Portable Flashing Beacons
4-1204F Construction Area Signs
4-1204G Channelizers
4-1204H Temporary Railing (Type K)
4-1204I Traffic Cones
4-1204J Portable Changeable Message Signs
4-1204K Temporary Crash Cushion Modules
4-1204L Temporary Traffic Screen
4-1204M Temporary Signal system
4-1204N Traffic Plastic Drums
4-1204O Traffic Control System

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 of Traffic Controls for Construction and Maintenance Work Zones (Manual of Traffic Controls*). If a discrepancy occurs between the contract plans and specifications and the *Manual of Traffic Controls*, 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 Manual of Traffic Controls* 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 of Traffic Controls*. When pilot vehicles are used, radios are required.

4-1203B Barricades

Ensure the contractor maintains barricades in a good state of repair and keeps the reflective surfaces clean. If weighting is necessary, use only bags of dry sand, and place all weights on the feet or lower parts of the frame or stays. Placing objects any higher, or using hard objects such as concrete or rocks for weights, may lead to injury or property damage should a vehicle hit the barricades.

4-1203C Flashing Arrow Signs

See that the proper types of flashing arrow signs are used as shown in the plans or as described in the special provisions.

Observe the equipment in operation and do the following:

- Ensure the lights are dimmed at night and set on bright during daylight hours.
- Verify the lights are not glaring into approaching traffic, especially truck traffic.
- Ensure compliance with at least the minimum visibility distances.
- Ensure the signs are properly aimed at approaching traffic. Pay special attention to the aiming of the sign whenever solar-powered signs are used. The special bulbs used with solar signs have much narrower beams than do conventional bulbs and, therefore, require greater care while being aimed.

4-1203D Portable Delineators

Require the contractor to immediately replace or restore portable delineators to their original location in an upright position when displaced or knocked down. Ensure the use of only one type of portable delineator on the project.

4-1203E Portable Flashing Beacons

Verify the proper operation and location of these beacons.

4-1203F Construction Area Signs

Ensure that the contractor promptly installs, relocates, covers, and removes signs as the contract requires. Construction signs should be covered or removed whenever they no longer serve a purpose. Verify that covers placed on sign panels completely block out any messages so that the messages cannot be seen day or night. The covers should also present a workmanlike appearance.

When it is necessary to weight sign standards to prevent the wind from overturning them, sandbags may be used. Do not permit rocks, broken concrete, or other hard objects to be used for this purpose.

Review construction area signs often during the course of the work. Require that signs be maintained as provided for in the contract. Signs should be clean, clearly visible, and repaired immediately if damaged.

4-1203G Channelizers

Check the contractor's layout work. Determine that the pavement is clean and dry and that the contractor places the channelizers in conditions that meet the required temperatures. If channelizers are displaced or fail to remain in an upright position, they are to be replaced at the contractor's expense.

4-1203H Temporary Railing (Type K)

Verify all new and used rail elements comply with requirements for end connection and surface finish. Order repainting when needed.

4-1203I Traffic Cones

Prohibit the use of traffic cones that have been damaged or coated with asphalt or other substances to the extent the cones have lost their ability to function as intended.

4-1203J Portable Changeable Message Signs

Make a drive-through inspection while the signs are in operation. A portable changeable message sign (PCMS) needs to be located where it provides the approaching motorist with at least the minimum visibility and legibility distances required by specification.

PCMSs are to display only preapproved messages. The resident engineer must ensure that the messages conform to district and Caltrans policy. Prohibit messages that do not convey real-time information to the motorist. Examples of unacceptable messages include ones such as “Drive carefully,” “Have a Nice Day,” and “Thank you.”

PCMSs, like any other pieces of equipment, are subject to the “Public Safety” clauses of the contract. When they actively display a message, PCMSs are working equipment. At all other times, they are parked or nonworking. The specifications typically will require that operating signs placed within 1.8 m of traffic be protected with a standard shoulder closure. Protect or remove nonoperating signs within 4 m of traffic to comply with the requirements of the “Public Safety” clause (for parked equipment) in the special provisions. In many cases, placing a PCMS behind existing guard railing will protect it. In cases when it is not practicable to remove nonoperating PCMSs, consult the district traffic engineer. The district traffic engineer may permit the PCMSs to be protected with an array of crash cushions in lieu of the temporary railing (Type K) required by the “Public Safety” specification.

Unless the contract states otherwise, contractors are not required to have PCMSs available at all times for the discretionary use of the resident engineer.

The contractor is also not obliged to have a PCMS available during periods when the traffic control system is nonoperational.

A PCMS for information and guidance to motorists is required only during times, places, or activities stated in the plans and specifications.

4-1203K Temporary Crash Cushion Module

Check that crash cushion module arrays are installed according to the manufacturer’s instructions. Verify that all crash cushion modules are filled with the proper weight of sand. Check pallet heights. Also, ensure that when arrays are placed, a minimum clearance of 2.4 m exists between the array and the nearest traffic lane. Contact the district traffic engineer for recommendations if you cannot obtain proper clearance to the traffic lane.

Be sure that the contractor installs “P” or “R” markers when required.

4-1203L Temporary Traffic Screen

Immediately after installation, review the screen placement, especially near entrance and exit ramps. If the screen blocks motorist visibility, order the screen’s removal and consult with the district traffic engineer concerning possible alternatives.

The supporting steel pipes should be placed on the traffic side of the screen. Then, if a panel becomes dislodged, the plywood will fall away from traffic.

4-1203M Temporary Signal System

Periodically review the temporary signal system to document its maintenance. Record inspection dates and conditions observed in the project records to protect both the state and the contractor.

If a system shutdown occurs, planned or unplanned, the contractor must immediately provide flaggers to control traffic until the traffic signals are functioning correctly.

4-1203N Traffic Plastic Drums

Check the contractor's layout work. Require the proper maintenance of traffic plastic drums. Require that water or sand ballast for the drums is placed in the base only. Sandbags are not allowed for ballast.

4-1203O Traffic Control System

Many projects will require the contractor to submit a request for a lane closure in advance of the intended date. This advance notification affords Caltrans the opportunity to coordinate work within the highway corridor. Review the contractor's requests both to avoid oversights and also to identify and reduce the number of unnecessary requests.

If the contractor fails to comply with the special provisions' clause titled "Closure Requirements and Conditions," by not opening the highway promptly, the contractor must submit a written work plan demonstrating that the highway will be opened in a timely manner in the future. Do not permit any lane closures until the contractor submits this plan and it is approved in accordance with district policy.

4-1203O (1) Field Adjustments

Field adjustments to the traffic handling plans are frequent occurrences. Adjustments must be made to ensure adequate sight distance, to avoid locations with multiple decisions, to accommodate expected queues, and to coordinate activities at multiple locations. The following are typical situations where field adjustments are necessary:

- Vertical and horizontal curves – Ensure tapers are visible for their entire length to approaching traffic. Do not hide the taper of a traffic control system behind a vertical or horizontal curve. Extend the tangent portion of the closure to better position the taper. (Under ideal conditions, all advance warning signs and the taper would be located in a tangent with the taper placed on a slight upgrade for improved visibility.)
- Ramps and connectors – Managing ramps and connectors within a lane closure presents several problems. Extend exit ramp tapers back through the lane closure as an extension of the ramp's shoulder line. Avoid sharply angled tapers. Extend entrance ramps through the closed lane by projecting the left shoulder line.
- Traffic queues – Contain traffic queues completely within the advanced warning signs of any closure. Containment may require modestly increasing the spacing between signs or require the placing of additional signs. Some districts have adopted a practice of providing motorists additional advanced warning by displaying information a mile or more in advance of the closure using portable or fixed changeable message signs. In metropolitan areas, this type of advance warning may be feasible through the cooperation of the transportation management center.
- Multiple closures and inter-project coordination – Avoid multiple closures with overlapping sign patterns. Connect closures by extending the tangents.
- Length of Closure — Avoid long closures with no evidence of activity. Consider placing supplemental tapers within an existing closure. When the work has safely progressed beyond the supplemental taper, remove the upstream taper and tangent. Ensure advanced warning signs for the new taper are located correctly.

If long closures are unavoidable, protect the active work area by placing barricades or drums across the closed lanes, upstream of the work area. Also, when possible, use barrier vehicles between the approaching motorist and workers on foot.

4-1203O (2) Placement Sequence and the Start of Work

Completely install the traffic control system before commencing work. The following gives you some installation instructions depending on the situation in which the system will be used:

- Systems affecting traffic only in one direction – Start with the first device that the drivers will see as they enter the work zone. (Usually a C18 "Road Construction Ahead" or C23 "Road Work Ahead" sign.) Additional devices are placed in sequence, moving in the direction of the traffic flow. Move the workers and equipment onto the closed lanes only after all system components are in place.
- Systems affecting traffic in both directions – Install the first sign drivers will see traveling in the opposing direction. Then install in sequence all remaining signs and devices in the opposing direction of travel. Next install the first sign drivers will see in approaching the work area from the affected direction. Place all remaining signs and devices in sequence through the work area. If flaggers are to be used, have flaggers take their stations; then move workers and equipment onto the road.
- Removal of the traffic control system – Remove all workers and equipment from the roadway. Then remove the devices and signs in the reverse order of placement. Restore all signs and signals to normal operation.

4-1203O (3) Drive—Through Inspection

Immediately after installation, make a drive-through inspection of the system. During the inspection, drive the system as though you had no knowledge of the work zone. Ensure the intended vehicle path is clearly visible. Remember that the motorist has no knowledge of the traffic control plan and is entirely dependent on the system for warning and guidance. Document this inspection in the daily report.

4-1203O (4) Maintenance

Ensure a contractor's employee is assigned to maintain all night closures and any daytime closures over 1.6 km in length. Maintaining such closures is a full-time assignment, and the assigned worker should have no other duty. Ideally, the assistant resident engineer should be able to communicate directly with the contractor's maintenance person by radio or cellular phone. The maintenance person should have spare cones, signs, and barricades available to replace or restore, system elements displaced or destroyed by traffic.

4-1203O (5) Reverse Operations Inside Closures

Workers can operate vehicles opposite the flow of traffic inside a closed lane. However, the workers should do so in a way that does not confuse approaching drivers or upset approaching traffic. The following practices are recommended if opposing operations are undertaken:

- During daylight operations, the vehicles facing oncoming traffic should have their headlights and their flashing amber lights turned on at all times.
- During night operations, the vehicles should have their headlights turned off and their hazard lights and flashing amber lights turned on.
- When removing a lane closure while facing traffic, the traffic control truck must turn around and back up through the taper area.

- At no time should a U-turn be permitted in traffic, and no vehicle should face towards traffic except when completely within a closed lane.

4-1204 Measurement and Payment

4-1204 Measurement and Payment

The following are directions for measuring and paying for various traffic control devices for construction areas:

4-1204A Flagging

Section 12-2.02, "Flagging Costs," of the *Standard Specifications* requires that the cost of providing flaggers be divided equally between the state and the contractor. Determine the total cost using the force account method. The contractor is to be paid one-half of the computed total amount.

The division of costs applies to all flagging required to perform the planned work except in special situations cited in the special provisions. The state's share of flagging costs are to be paid only when public traffic is involved.

The cost of providing flaggers includes the cost of transporting personnel between a central point and the location of the work, or from one location to another as necessary. The cost for flaggers also includes the costs of any stands or towers required for the flaggers to do their jobs properly. The cost does not include the costs of placing, maintaining, and removing construction area signs during flagging operations.

The flagging costs incurred in connection with increased or decreased work paid for at contract prices will be subject to the fifty-fifty split. It is assumed that the contractor's share of such costs is included in the contract item price.

When work is added and paid for as extra work, the contractor should be compensated 100 percent for flagging costs associated with the extra work.

If changes are made at the request of, and for the benefit of the contractor, the contractor must pay for the additional flagging costs unless there are also particular benefits to the state that would warrant a sharing of the costs.

Include 50 percent of flagging costs in costs calculated according to Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications*. Also, include the contractor's 50 percent share of flagging costs in cost calculations for computing adjustments for increased or decreased item quantities.

4-1204B Barricades

Initial placement of each barricade (as shown on the plans or as directed by the resident engineer) is paid for as a contract item at the time of placement. Subsequent relocations of each barricade are paid for as extra work using the force account method. Damaged barricades must be repaired at the contractor's expense, regardless of the cause, including damage by public traffic.

4-1204C Flashing Arrow Signs

Flashing arrow signs are paid for as part of the contract item for traffic control system.

4-1204D Portable Delineators

Portable delineators are paid for as part of the contract item for traffic control system.

4-1204E Portable Flashing Beacons

Portable flashing beacons are measured and paid for at contract item price by the unit except when they are part of a traffic control system. In that case, portable flashing beacons are paid for as part of the contract item for the traffic control system.

4-1204F Construction Area Signs

Construction area signs, except those used in traffic control systems for lane closures, are paid for as a lump sum item. The cost of the contractor's inventory of replacement sign materials is included in the contract price for construction area signs. Additional signs ordered by the resident engineer are paid for as extra work.

The cost of covering, uncovering, and removing signs (when they are no longer needed) is included in the contract price for construction area signs.

When determining how much to include on a progress pay estimate, withhold some payment sufficient to cover the cost of maintaining and removing the signs.

4-1204G Channelizers

Channelizers are paid for by the unit. The contract item price includes the costs of maintaining, replacing, and repairing channelizers. The contract item price also includes the costs of work necessary to restore channelizers damaged by public traffic.

4-1204H Temporary Railing (Type K)

Review the "Public Safety" section in the special provisions. Do not use the contract item for temporary railing (Type K) to pay for temporary railing that is placed to fulfill the requirements the "Public Safety" section.

Withhold some payment from progress pay estimates to cover the cost of removing temporary railing (Type K).

4-1204I Traffic Cones

Traffic cones are paid for as part of the contract item for a traffic control system.

4-1204J Portable Changeable Message Signs

A portable changeable message sign (PCMS), commonly bid as "Furnish - Each" or "Furnish - Lump Sum," requires the contractor to place, operate, maintain, and remove the sign as directed by the resident engineer.

The resident engineer, with a minimum notice of one full working day, may direct the contractor to provide PCMSs for use not otherwise provided for in the contract. Payment due the contractor is to be computed as extra work.

4-1204K Temporary Crash Cushion Modules

Review the "Public Safety" section of the special provisions. Do not use the contract item for temporary crash cushion modules to pay for temporary crash cushion modules that are placed to fulfill the requirements of the "Public Safety" section.

Withhold some payment from progress pay estimates to cover the cost of removing temporary crash cushion modules.

4-1204L Temporary Traffic Screen

Temporary traffic screen is measured and paid for according to the special provisions.

4-1204M Temporary Signal system

The lump sum payment for this item includes all the costs of hauling state-furnished materials between the designated pickup locations, the project, and the designated salvage location. If the pickup or salvage location is changed, then any additional costs or savings to the state should be recognized.

Flaggers are not a shared cost if the contractor provides them as a result of a shutdown of the signals for any reason. This provision is an exception to the general practice of sharing the cost of flaggers.

4-1204N Traffic Plastic Drums

Count the traffic plastic drums for payment as they are placed in the locations shown on the plans. Drums used instead of cones, barricades, or delineators as part of a traffic control system or used as specified under "Public Safety" of the special provisions are not to be paid for at contract item price.

4-1204O Traffic Control System

For all project work, the lump sum payment for traffic control system includes payment for all labor, equipment, and materials to install, maintain, and remove traffic control system as shown on the plans or *Standard Plans*. The contract item for the traffic control system includes payment for portable signs, cones, delineators, and flashing arrow signs as shown on the plans for the traffic control system.

Include compensation or credit in the change order when an ordered change in the work affects the contract item for the traffic control system.

Traffic control costs in support of extra work are to be paid as part of the extra work. Compute the payment as a force account or as an adjustment of compensation based on a force account analysis. The contract change order that authorizes the extra work must reflect these costs.

In addition to adjustments for ordered changes, the resident engineer may consider adjustments to the contract item for the traffic control system when the following circumstances exist and result in additional lane closures:

- A material change exists over or under the engineer's estimated quantity that is not caused by an ordered change for a contract item or items.
- Insufficient information exists in the contract for the contractor to verify the engineer's estimated quantity for the contract item or items. The contractor relied on the engineer's estimated quantity or quantities to determine the number of lane closures required.
- The additional lane closures are solely for work on the contract item or items meeting the criteria for the above.

Calculate adjustments for the circumstances listed above on a force account basis.

Section 15 Existing Highway Facilities

4-1501 General

4-1502 Before Work Begins

4-1503 During the Course of Work

4-1503A Obliterating Roads and Detours
4-1503B Removing Traffic Stripes and Pavement Markings
4-1503C Removing Pavement Markers
4-1503D Salvaging Materials
4-1503E Removing Concrete
4-1503F Removing Bridges
4-1503G Handling Mailboxes

4-1504 Measurement and Payment

Section 15 Existing Highway Facilities

Section 15 Existing Highway Facilities

4-1501 General

4-1501 General

The information in this section corresponds to Section 15, "Existing Highway Facilities" of the *Standard Specifications*. The following sections of the *Standard Specifications* also have related information:

- Section 7-1.11, "Preservation of Property"
- Section 7-1.12, "Indemnification and Insurance"
- Section 8-1.10, "Utility and Non-Highway Facilities"

The work described in this section covers removing existing highway facilities that interfere with construction within the area that must be cleared and grubbed, as specified in Section 16, "Clearing and Grubbing," of the *Standard Specifications.*

The contractor is required to protect all existing highway facilities (whether shown or not shown in the contract plans) that are to remain in place, either temporarily or permanently, and that are to be salvaged, relaid, reset, relocated, or reconstructed. When such facilities are damaged as a result of the operation, the contractor is responsible for repair or replacement. Caltrans is responsible for repair or replacement of existing highway facilities that are damaged by public traffic.

4-1502 Before Work Begins

4-1502 Before Work Begins

Before work begins, take the following steps:

- Inspect existing facilities that are to be salvaged, relaid, reset, relocated, or reconstructed. If their condition has deteriorated sufficiently to prevent the planned use, write a contract change order to provide for new materials.
- When facilities to be removed belong to a city, county, or other agency, check with the applicable agency before disturbing the facility.
- The district maintenance unit maintains existing signals and lights. Keep the maintenance region manager informed of specific needs or changes.
- Document existing conditions with photographs or video.

4-1503 During the Course of Work

4-1503 During the Course of Work

During the work, take the steps below for obliterating roads and detours, removing traffic stripes, pavement markings, pavement markers, salvaging materials, removing concrete and bridges, and handling mailboxes.

4-1503A Obliterating Roads and Detours

In covering obliteration, the *Standard Specifications*' objective is to ensure a well-drained, presentable area. You may allow the contractor the option of removing oversize material in lieu of breaking it into the required size, provided the objective is met and no other complications are involved. Update the water pollution control plan (WPCP) to reflect the new conditions.

4-1503B Removing Traffic Stripes and Pavement Markings

Take the following steps for traffic stripes and pavement markings:

- Yellow striping generally contains lead, so ensure special handling for removal and disposal. Usually, if this striping was identified in the contract, the special provisions will cover removal and disposal. However, if yellow striping needs to be removed and the special provisions did not identify special handling, contact the district hazardous waste coordinator to determine if the striping needs to be tested.
- Observe areas where traffic stripes or pavement markings have been removed. If conditions are such that, after contractual requirements for removal have been met, the resulting areas present a traffic hazard, order additional work to eliminate the hazard. Make your observations in the same conditions that public traffic will experience, such as driving during the night, on wet pavement, or in low sun angles.

4-1503C Removing Pavement Markers

Take the following steps for pavement markers:

- Observe the removal procedure for pavement markers. As early as possible, advise the contractor of the required type of repair to damaged pavement or surfacing.
- Note the provisions for protecting public traffic from fragments. Require the contractor to remove all removed markers and fragments from the right-of-way as specified in Section 15-2.03, "Disposal," of the *Standard Specifications*.

4-1503D Salvaging Materials

During salvage operations, the contractor is responsible for any loss or damage. Keep accurate records of inventory to ensure that all materials to be salvaged are delivered in suitable condition to the specified location. For additional guidelines for handling materials to be salvaged, see Section 3-4, "Scope of Work," of the *Construction Manual*.

4-1503E Removing Concrete

Observe concrete removal to ensure the work complies with contract requirements. Pay particular attention to items that can be observed only during the work. These items include the following:

- Removal to the specified minimum depth below finished grade. Enter notes into the appropriate daily report that this feature was checked and meets requirements.
- Disposal into adjacent embankments. See Section 19-6, "Embankment Construction," of the *Standard Specifications*. Note that both lateral and vertical limitations are met. Make every effort to include disposal locations in as-built plans.
- Breakage of floors of concrete basements, pits, and structures to prevent entrapment of water. Note the inspections in the appropriate daily report.

4-1503F Removing Bridges

Take the following steps for removing bridges:

- The contractor must submit bridge removal plans. The Office of Structure Construction's representative on the project has complete responsibility and authority for reviewing and approving bridge removal plans and administering bridge removal specifications. On projects that do not have a representative

from the Office of Structure Construction, consult with the structure representative assigned to the area. Further information on bridge removal oversight is contained in the Office of Structure Construction's *Bridge Construction Records and Procedures Manual*.

- When bridge removal occurs over or adjacent to public traffic or railroad property, carefully review the contractor's submittal of removal details and refer to the requirements of Section 15-4, "Bridge Removal," of the *Standard Specifications.* Also refer to the contract special provisions. Details about handling traffic around or through the area should be included.
- Ensure the contractor will have sufficient resources on hand and has planned in sufficient detail to ensure the work will be completed within specified time limits.
- Review shielding plans to ensure the contractor meets specified requirements and that shielding serves its intended purpose.
- Ensure the contractor conducts all bridge removal in a manner that protects pavement and other facilities from damage. Make sure the contractor has addressed this requirement in planning the operation.

4-1503G Handling Mailboxes

Before starting construction activities, document the existing conditions of mailboxes. Wherever possible, mailboxes should be set in their final location. However, it is often necessary to move mailboxes a number of times during construction. Any movement of mailboxes purely for the convenience of the contractor is the contractor's responsibility, but ensure the contractor maintains proper position and access to mailboxes. Here are the procedures for mailboxes encountered on construction projects:

- If the mailbox is outside of the limits of the new work, it may be allowed to remain.
- If it is within the limits of the new work and does not have to be moved either laterally or vertically to conform to the ultimate section, it may be allowed to remain.
- If under either of the above conditions the contractor desires to remove the mailbox to facilitate equipment operation, the contractor must replace the mailbox at the contractor's expense. The contractor must also arrange for the receipt of mail in the interim.
- If a change in grade or relocation of a roadway edge results in the need to raise, lower, or laterally move the mailbox, the work done to the mailbox will be made at Caltrans' expense.
- If the mailbox must be removed entirely, it must be turned over to the property owner.
- Where five or more mailboxes are concentrated at a single point, a stand, on which the property owners may place their mailboxes, may be built at Caltrans' expense. This stand will prevent the unsightly appearance resulting from a group of posts of various sizes, heights, and characters. The approach to the stand should be surfaced sufficiently to make the stand accessible under all weather conditions.

4-1504 Measurement and Payment

4-1504 Measurement and Payment

You must be familiar with the measurement and payment clauses covering existing facilities that are to be removed. Determine whether the necessary measurements must be taken before or during removal.

Section 16 Clearing and Grubbing

Section 16 Clearing and Grubbing

4-1601 General

4-1601 General

This section covers clearing and grubbing. Clearing and grubbing is usually one of the first work items and is generally paid as a lump sum item or by the hectare. During clearing and grubbing, pay special attention to the preservation of property and environmentally sensitive areas.

4-1602 Before Work Begins

4-1602 Before Work Begins

During this preliminary inspection, take the following steps:

- Review the plans, special provisions, and right-of-way agreements for details that may require special staking or issuing contract change orders.
- Ensure the approval of the water pollution control plan. Review the plan to ensure clearing and grubbing conforms to the plan.
- Ensure the clear marking of features and facilities that are to be preserved.
- Discuss with the contractor such items as the marking of any special locations, such as environmentally sensitive areas and any additional areas to be cleared. Call the contractor's attention to any environmental commitments Caltrans made or any regulations or permits other agencies require, or both.
- Review planned disposal sites.
- Before disposing of material outside the right-of-way, review Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the *Standard Specifications* to determine the contractor's necessary action. Unless the disposal site is already cleared for state use, the contractor must obtain and present to the resident engineer any permits, environmental studies, and clearances, among other items, that are required by agencies having jurisdiction over the site. Ensure the arrangement of a joint meeting of the resident engineer, the contractor, and other agencies that have an interest in clearing.
- Ensure that all the documents necessary for disposal outside the right-of-way have been obtained. (See Section 7-1.13 "Disposal of Material Outside the Highway Right of Way" of the *Standard Specifications* and Section 3-708 of the *Construction Manual* for details.) Provide the contractor with the required written permission for disposal outside the highway right-of-way.
- Before permitting the contractor to chip plant materials for disposal on the job site , investigate to determine if plant disease or insect pests will be spread to disease-free or insect-free areas. You can obtain technical advice on diseases and insects in cultivated trees from the county agricultural extension offices. For advice about natural forest trees, contact the California Department of Forestry or the U.S. Forest Service. If the decontamination of chips is advisable and the contract does not provide for pest control, ensure this work is done as an ordered change.

4-1603 During the Course of Work

4-1603 During the Course of Work

During the work, take the following steps:

- Ensure the contractor's equipment has the required safety devices to protect personnel. In forest areas, ensure the use of the required spark arresters on equipment.
- Ensure the contractor's operation does not create a public hazard. If necessary, require traffic control during timber falling.
- Periodically observe the operation to ensure the prevention of damage to adjacent property and environmentally sensitive areas and to ensure the preservation of trees and facilities that are to remain. As set forth in permits and agreements, verify the contractor's adherence to environmental commitments and permits. For any deviations and violations, document and require corrective action by the contractor. The resident engineer should consult with the district environmental unit for review and comment.
- Determine the limits of clearing areas that do not require stump removal and check the height of stumps above natural ground.
- Determine if dead, dying, or otherwise unstable trees located in the right-of-way (but outside the clearing limits) constitute a hazard. Any such trees should be removed.
- The contract may state that merchantable timber is the property of other agencies. Check that any timber handling adheres to the agreement with these agencies.
- When burial of debris within the right-of-way is permitted, ensure the debris will not act as a permeable layer, does not block drainage, and will not interfere with maintenance. Also, ensure no material is buried within the roadway prism unless otherwise allowed in the special provisions.
- Ensure that the burial of debris, both on and off the right-of-way, is not aesthetically detrimental and does not create contamination problems. Keep accurate records whenever any solid wastes that might interfere with future work are disposed of by burying the solid wastes adjacent to the roadway. Also, show this information on the as-built plans.
- When burning is permitted, ensure the contractor has obtained a permit from the air pollution control officer of the local or regional authority. Prohibit burning at locations where the smoke will impede visibility for public traffic. Ensure the contractor takes adequate precautions, such as constructing fire trails and posting guards, to prevent the uncontrolled spreading of fires. When poison ivy, oak, or sumac is present in areas where burning is otherwise permitted, ensure the burning of such material complies with any local ordinances or safety regulations.
- Ensure that tree branches extending over the roadway are cut off as specified. During the removal of additional branches, direct the contractor to present a balanced appearance of the trees. Check that the contractor treats as specified any scars resulting from removal.
- A checklist showing locations where clearing is incomplete may be necessary in the final stages of the operation. Complete payment should not be made until all areas have a neat and finished appearance.

4-1604 Measurement and Payment

4-1604 Measurement and Payment

If the work is not to be completed within one pay period, determine a pay system that provides for periodic payments that represent the true percentage of the work completed.

Some contracts may have a limitation on payment for clearing and grubbing. Refer to section 5 of the special provisions.

Section 17 Watering

Section 17
Watering

4-1701 General

4-1701
General

The contractor is responsible for developing a water supply (including any permits).

4-1702 Before Work Begins

4-1702
Before Work Begins

During this preliminary inspection, take the following steps:

- Determine the quality of the water if it is to be used in products for which there are specific water quality requirements.
- Determine if the contractor intends to use chemical additives in water. Ensure that the additive is appropriate for the intended use.
- If the contract requires a mobile watering unit, ensure that one is available on the project at all times.
- Ensure all necessary watering equipment is of the type specified.

4-1703 During the Course of Work

4-1703
During the Course
of Work

During the course of work, take the following steps:

- Determine whether the water supply as developed can both supply the project without extensive work delays and also supply adequate amounts for dust control.
- If the contractor uses a fire hydrant, ensure that proper arrangements have been made with the local water utility company.

4-1704 Measurement and Payment

4-1704
Measurement
and Payment

Once the water supply is developed and the entire project's needs are met, authorize for progress payment 100 percent of the item (subject to limiting pay clauses). When determining percentages for partial payments, consider possible work required in future stages.

Section 18 Dust Palliative

Section 18
Dust Palliative

4-1801 General

4-1801
General

The contractor is required to apply dust palliative under the direction of the resident engineer as provided in Section 18 of the *Standard Specifications*.

4-1802 Before Work Begins

4-1802
Before Work Begins

Determine whether a dust palliative should be applied in lieu of other methods of dust control. When making this decision, consider the effects on the environment, safety, and convenience as well as the obvious economic factors. Place an appropriate value on these factors. For assistance, call the district coordinator for the water pollution control plan or the district environmental unit. The district lab can help with recommendations for an acceptable type of control.

4-1803 During the Course of Work

4-1803
During the Course of Work

Advise the contractor of the rate of dilution for binders that are miscible in water. Make sufficient observations or checks to verify that the contractor obtained the required binder and that it was diluted properly.

Advise the contractor of the desired rate, number, and limits of the application.

The proper rate and proportion must be found by experimenting with the soil involved. Large-particled, clean materials require thicker films of binder to make them stick together than do fine-grained particles. Dust palliative will not penetrate as effectively when there is a large percentage of binder because binders are heavy, viscous liquids. For example, when a well-compacted clay is being treated, it should be treated lightly and more frequently with a small percentage of binder so that better penetration will occur. When loose, uncompacted sand is being treated, it may be desirable to spray in heavier amounts with a larger proportion of binder.

4-1804 Measurement and Payment

4-1804
Measurement and Payment

In general, the above instructions apply only when separate payment is to be made for dust palliative, either under a contract item or by contract change order. Only allow payment for dust palliative when public traffic causes dust.

The resident engineer must keep records in sufficient detail to support payment for dust control while also excluding portions for which separate payment is not to be made. Record any verbal agreements about payment in the daily report.

Section 19 Earthwork

4-1901 General

4-1902 Before Work Begins

4-1902A Roadway Excavation
4-1902B Blasting
4-1902B (1) Safety Considerations
4-1902B (2) Routine Duties
4-1902C Structure Excavation and Backfill
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4-1903A Roadway Excavation
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4-1903A (3) Slides and Slipouts
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4-1903B Structure Excavation and Backfill
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4-1904 Measurement and Payment

4-1904A Roadway Excavation
4-1904B Structure Excavation and Backfill
4-1904C Ditch Excavation
4-1904D Borrow Excavation

Section 19 Earthwork

Section 19 Earthwork

4-1901 General

4-1901 General

Earthwork includes operations connected with roadway excavation, blasting, structure excavation, backfill, ditch excavation, compaction, embankment construction, and borrow excavation. For earthwork requirements, refer to Section 19, "Earthwork," of the *Standard Specifications*. The special provisions usually include additional earthwork requirements.

Many potential problems are discovered during all phases of construction staking, so it is essential that the resident engineer and assistant resident engineers maintain good lines of communication with the survey party chief. For the same reason, assistant resident engineers should also maintain good communication with the contractor's grade checkers and supervisory personnel.

4-1902 Before Work Begins

4-1902 Before Work Begins

Resident engineers and assistant resident engineers must do the following to prepare for earthwork operations:

4-1902A Roadway Excavation

- Review the project plans, special provisions, right-of-way agreements, environmental reports, and other data about earthwork. Advise the contractor of any features that may require special handling. Take steps to ensure that environmentally sensitive areas are protected.
- Review the soil profile and materials information.
- Make a preliminary check of earthwork quantities. Decide how quantities will be measured for partial payments. See "Measurement and Payment" in this section.
- Review the status of utility relocation work. Advise the contractor of any changes that may affect the work. See Section 3-809, "Utility and Non-Highway Facilities," of the *Construction Manual* (manual) for more details on utilities.
- When the contract requires, for trench excavation, obtain from the contractor a detailed plan showing the design of shoring, bracing, sloping, or other provisions for workers' safety. Ensure either that a registered civil or structural engineer signs the plan or that it conforms to the shoring system standards established by the *Construction Safety Orders* of the Division of Occupational Safety and Health (Cal/OSHA).
- Plans submitted by the contractor of the shoring details for excavations on or affecting railroad property must be satisfactory to the railroad company involved. To meet this requirement, an engineer who is registered as a civil or structural engineer in the State of California must sign the plans (whether or not such plans deviate from Cal/OSHA standards). Submit the plans to the Office of Structure Construction in the same manner as for falsework drawings. The Office of Structure Construction will obtain the railroad company's approval and notify

the resident engineer. (For additional details see the *Bridge Construction Records and Procedures Manual*, Volume II, and the *California Trenching and Shoring Manual*.) After review by the Office of Structure Construction and approval by the railroad company, return one set of the plans to the contractor with a written statement that "The plans are approved pursuant to Section 5-1.02, "Plans and Working Drawings," of the *Standard Specifications*.''

- Discuss with the contractor the schedule of earthwork operations, sources of materials, equipment capacities, and any potential hauling problems involving public traffic. Ensure that the contractor's plan of operation complies with any specified order of work, environmental agreements, and pollution control requirements.
- Ensure the contractor's plan to control water pollution has been approved and implemented before beginning work.

4-1902B Blasting

4-1902B (1) Safety Considerations

All blasting work must be conducted in strict accordance with the *Construction Safety Orders* or a properly approved alternate safety plan. An alternate safety plan is required when a 15 m clear zone cannot be maintained around the loading area, such as a blasting area adjacent to traffic. The *Construction Safety Orders* contain the required elements of an alternate safety plan. These elements include low-sensitivity explosive materials, initiation systems that cannot be affected by stray current or radio frequency energy, a system to detect lightning and electric storms, and barriers to prevent entry by vehicular traffic.

In addition to reviewing any blasting plan the contract requires, discuss the planned blasting operation with the contractor. Address the following areas of concern before blasting begins:

- Blast area security- Review the procedures the contractor proposes to ensure they are adequate to protect the public from unauthorized entry into the blast area during the loading, arming, and detonating of the explosives. Often this review will require the contractor to consider more than automobile traffic. Consideration should include recreational activities such as boating, hiking, and biking or production activities such as farming and ranching. These types of activities may utilize unusual entry routes.
- Electrical storms- No explosive can be considered "safe" should lightening strike directly or nearby. Always consider lightning when planning to use explosives. During a review of the electrical storm section of the contractor's safety plan, include an evaluation of the plan's objective and the procedures and equipment to be used.
- Radio transmissions- Review the contractor's proposal for controlling or eliminating the possibility of a premature detonation due to radio transmissions (including transmissions from cellular telephones).
- Warnings and signals- Review the warnings and signals to be used and, if an unsafe condition should be observed, the method by which the blast can be stopped.

  1. The audible signals (as shown in the *Construction Safety Orders*) are a widely used standard and intended to inform workers in the area that blasting is in

progress. These signals are not intended to be meaningful to the public. The use of these signals is the preferred method of communication within the work area.

2. Signs, guards, and flaggers should be used for public communications. In many situations, the contractor may need a separate means of communication and control for public traffic. If radio communications will be used for site monitoring or traffic control, ensure the contractor adheres to the safe distance tables in the *Construction Safety Orders*. Adhering to safe distances becomes critical when "rolling roadblocks" or "traffic breaks" are to be used.

- On-site authority- Cal/OSHA regulations require that all blasting operations be under the direct control of a licensed blaster. The contractor should identify this person as the person who has final authority over the blasting and who will be responsible for giving the "all clear" following a postdetonation inspection of the blast area.

  The relationship between the resident engineer and the licensed blaster is different from the relationships normally encountered on most contracts. By law and regulation, the licensed blaster is responsible for and is the final authority on the conduct of blasting operations. The resident engineer may only intervene in the case of a violation of the *Construction Safety Orders* or public safety. When intervening, the resident engineer may only suspend the operation until the hazards are abated or the contractor (blaster) conforms to the safety orders.

- Misfires- Misfires are very unusual occurrences, but when they occur, they pose serious safety problems. These problems have the potential to escalate rapidly when public traffic is involved. Ensure the adequacy of the contractor's contingency plan for misfires.

4-1902B (2) Routine Duties

Review the special provisions for additional requirements or restrictions related to blasting. Sometimes presplitting of rock excavation is required, and considerable detail covering this work is included in the contract. The special provisions may also include other requirements such as ground motion limits and preblast surveys of nearby buildings.

The resident engineer should also perform the following routine duties, among others:

- Ensure the blaster understands the survey stakes sufficiently to avoid placing explosives beyond slope tolerances.
- Order the discontinuance of any method of blasting that leads to overshooting or destruction of property or natural features.
- Ensure that all legally required warning signs are in place.

4-1902C Structure Excavation and Backfill

To ensure the integrity of a structure, resident engineers and assistant resident engineers must pay considerable attention to structure excavation and backfill. Various categories of structure excavation and backfill and various methods of measurement and payment exist. Often, the payment limits will not match the physical

limits used in the construction of a facility. Before beginning work, it is essential to study the contract plans, *Standard Plans*, *Standard Specifications*, special provisions, and the work site. Also, take the following steps:

- Before excavation, review the plans and stakes to determine the following:
  1. Whether the structure will clear other facilities
  2. Whether the structure will function as planned in this location or should be adjusted
  3. Whether sufficient data is available for quantity calculations
- To install culverts in an embankment, ensure the embankment is at the elevation specified.
- Decide whether a camber is required in a culvert or other drainage structure. If so, give the survey crew or the contractor, or both, the necessary data.
- Before backfilling, inspect structures.
- Test backfill material for compliance with specifications and test compaction, and before backfilling, ensure that any required strutting or bracing, as shown on the plans, is in place.

4-1902D Ditch Excavation

Before excavating ditches, review the plans and the site to determine if original ground needs to be cross-sectioned. Most ditches will require slope stakes and, in even ground, you can use slope stake information alone to calculate quantities. If cross sections are necessary, the survey party can accomplish that work at the same time as slope staking.

4-1902E Embankment Construction

Carefully examine areas upon which embankments are to be constructed. Include a review of the materials information and an on-site observation during clearing.

Review permits, environmental studies, and clearances to ensure the contractor meets all commitments, including providing any necessary access roads. Where work will affect areas outside of the right-of-way or in environmentally sensitive areas, consult with the district environmental unit.

Look for the following:

- Lush vegetative growth in local areas, seepage, and springs indicating ground water.
- Trees, brush, or fences leaning downhill, indicating slippage of the surface material.
- Rolling, hummocky terrain, twisted trees, or lack of vegetation in otherwise timbered areas, indicating a large slide.

When foundation problems are known during the project's design, normally the contract will cover treatment of such areas. However, when serious problems exist that the contract does not cover, consult with the district materials engineer or the geotechnical engineer, or both.

Here are some of the most common major foundation problems and the types of solutions frequently recommended:

- The weight of the embankment displaces or consolidates material in the foundation causing settlement. This condition is corrected by the following:

  1. If it is economically feasible, remove the plastic material.
  2. Placing strut fills or buttress fills on either or both sides of the embankment to act as a counterweight. The fills resist any upward movement of the foundation material adjacent to the embankment.
  3. Constructing the embankment at a controlled rate so that any anticipated settlement will take place over time and allow hydrostatic pressures to dissipate.
  4. Constructing surcharges on the completed embankment to accelerate settlement. Settlement platforms or piezometers, or both, monitor rates of settlement. They may be installed and used under the direction of the district materials unit .

- Loss of stability may occur when the embankment forms a dam and impounds water, causing saturation. This may result in sloughing of part or all of the fill. This condition is corrected by the following:

  1. To provide drainage, placing a filter material blanket over the area that is to receive embankment. Stripping foundation material may be necessary.
  2. Constructing ditches or underdrains at the upper side of the fill to intercept water. This method is effective only if the underdrain or ditch intercepts and removes all the seepage water.

- The weight of a sidehill embankment causes movement on a slippage plane in the underlying foundation. This type of embankment failure is characterized by the mass movement of a large portion of the fill. This condition is corrected by the following:

  1. Constructing a stabilization trench through the slippage plane. Stabilization trenches, located beneath the embankment, are constructed in wet areas to intercept and remove water from deep, unstable embankment areas. These trenches may be major installations involving large quantities of excavation, filter material, and drainage pipe.
  2. Installing horizontal drains to drain water from the slippage plane.
  3. Changing a line or grade so that the roadway is in cut or on a smaller embankment, thus reducing the load on the slippage plane.

The contractor may often need to use combinations of the above methods for the most troublesome foundation problems.

Before the construction of embankments, also do the following:

- When consolidation of the embankment's foundation can be estimated and will be appreciable, adjust the width to be staked. When applicable, remember to include any such change in quantity calculations.

- If the foundation material will be displaced and consolidated, undertake additional measures. Place a line of " telltale" or "heave" stakes 3 to 8 m outside of and generally parallel to the toe of the fill slope. Set these stakes to line and elevation by normal survey methods so that they will indicate both vertical and horizontal movement of the ground. In addition, inclinometers or slope indicators and settlement platforms may be used. For installing these devices, contact the district materials unit. Ensure that adequate cover is placed to protect settlement platforms from damage by the grading equipment. Schedule regular monitoring and recording.

4-1902F Borrow Excavation

Review the contract for specific types of borrow the contractor will use. Also, in the resident engineer's pending file, review environmental clearances, including permits and right-of-way agreements, among other items, that may affect borrow excavation.

4-1903 During the Course of Work

4-1903 During the Course of Work

Inspect the earthwork operations identified below during the work.

4-1903A Roadway Excavation

Consider the following areas when inspecting roadway excavation:

4-1903A (1) Hauling Material

For the requirements for hauling material, refer to various sections of the contract and Section 3-701D(1), "Weight Limitations,'' of this manual. Section 19-1.02, "Preservation of Property," of the *Standard Specifications* further covers the hauling of earth, specifically with respect to spillage of material and dust control.

4-1903A (2) Unsuitable Material

Section 19-2.02, "Unsuitable Material," of the *Standard Specifications* defines unsuitable material as ". . . material encountered below the natural ground surface in embankment areas or below the grading plane in excavation areas. . ." Section 19-2.02 does not cover material within excavation areas. For unsuitable material, the resident engineer's duties include the following:

- For possibly unsuitable material, examine all basement material and all natural ground upon which embankments are to be constructed. Advise the contractor of the areas and depths of material to be removed.
- Before removing unsuitable material that is not shown on the plans or specifications, determine the method of payment for excavation and disposal:
  1. If payment will be at contract prices, record adequate measurements for calculating quantities.
  2. If the contractor requests payment to be made as extra work, obtain the request in writing. Prepare and process a contract change order, and keep the necessary records relating to extra work.
- Normally, unsuitable material may be placed in embankment or contour areas.
- Examine areas where the contractor has removed unsuitable material, and before backfilling, decide on any necessary drainage or other corrective action.
- Advise the contractor of the type of material that will be suitable backfill. Observe the operation to ensure it complies with specifications.

- In addition to routine data, record in the daily report all pertinent discussion with and orders to the contractor regarding unsuitable material.

4-1903A (3) Slides and Slipouts

Perform the following steps when handling slides and slipouts:

- Examine slopes for areas of potential slides. Decide on any corrective action necessary. Corrective action may include any of the measures suggested in the paragraph below. For detailed analysis and recommendations for major problems, consult with the district materials unit and geotechnical engineers.
- Examine slides and slipouts to determine their probable cause. Decide on any corrective work necessary. Corrective action for a slide may require totally or partially removing the slide and flattening slopes or installing horizontal drains or underdrains, or both. For small areas, consider constructing bulkheads or retaining walls. For large areas, consider constructing benches to reduce traffic hazards from falling material. When benches are constructed, provide access roads for future maintenance.
- Corrective action for a slipout may require totally or partially removing and reconstructing the embankment with more suitable material. Also, consider constructing fill struts, stabilizing trenches, and installing subsurface drainage facilities.
- When correcting slides and slipouts requires work in areas not already cleared for use during project development, new or revised permits, environmental studies, and clearances, among other items, may be required. Review all previously unidentified haul roads and flattened slopes to determine if they involve effects not covered by existing environmental clearance. If the needed area is outside of the environmental clearance, consult with the district environmental unit.
- Before removal or corrective operations, determine the method of payment:
  1. If the contractor requests the removal of slides and slipouts to be paid for as extra work, obtain this request in writing. When the resident engineer decides this removal should be paid as extra work, state this decision in the change order memorandum. Then prepare and process a contract change order when an ordered change or extra work is involved.
  2. When payment is by item price for roadway excavation, measure the additional quantities and enter them on appropriate source documents that clearly identify the limits of the slides or slipouts.
- Any applicable method or combination of methods of compensation may be used to pay for removing slides or slipouts. See Section 5-306C, “Methods of Payment,” of this manual for compensation methods.
- Decide where the contractor should deposit the material resulting from slides and slipouts. When practicable, use all the material for embankments or for flattening slopes or contour grading.
- Take before-and-after photographs of the slide area.

4-1903A (4) Slopes

The engineer responsible for earthwork must review the slope stakes and ensure missing stakes are replaced in accordance with Section 5-1.07, "Lines and Grades," of the *Standard Specifications*. Also, see Section 3-5, "Control of Work," of this manual and Section 13, "Staking Information," of the *Surveys Manual* for more information on staking. In addition, the resident engineer must perform the following steps:

- Make sufficient measurements to verify the proper start of slopes.
- Make sufficient spot-checks to verify the correct slope tolerances.
- Check the slope rounding for compliance with the contract. While the top of the slope is still reachable with equipment, decide whether the contractor should do additional slope rounding or contour grading.
- Ensure that the construction of any special items for erosion control complies with the contract. This review must include items on the contractor's approved plan for controlling water pollution.
- Ensure all top-of-slope or toe-of-slope ditches will drain.
- Ensure that embankment widening complies with the contract plans for installing guard railing.
- Examine slopes for material that blasting has shattered or loosened. Order the removal of this material.

4-1903A (5) Surplus Material

The resident engineer's responsibility for surplus material and related actions will vary considerably depending on the terms of a particular contract. Generally, for those contracts that include payment for embankment construction within the payment for roadway excavation, determine as early as possible whether there will be a surplus (or deficiency) of material. For contracts that provide separate payment for embankment, ensure only that the contractor satisfies the conditions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the *Standard Specifications*.

The following are some of the factors to analyze when determining whether there will be an unplanned surplus (or deficiency) of roadway excavation:

- Determine as adequate or not the amount of embankment estimated for subsidence of original ground, considering possibly different field conditions than those the design engineer anticipated.
- Variations of slopes, even within specified tolerances, can significantly effect quantities.
- Be alert to differences between pay quantities and the actual amount of roadway excavation as a result of curve correction. On some projects, this difference can significantly effect a surplus (or deficiency) of material.

- Decide whether the planned grading factors (shrinkage or swell) need to be adjusted based on actual conditions. The factors may be adjusted in any way the resident engineer judges to be appropriate. Appropriate judgments are based on the following:

  1. Previous experience
  2. Measurement of definable portions of excavation and resulting embankment
  3. In-place densities in excavation compared to in-place densities in embankment

In estimating the actual grading factor, also consider consulting with geotechnical engineers in the district materials unit who have local experience.

When the amount of any unplanned surplus is known, make plans for its ultimate disposal. Normally, do not order or permit any disposal before embankments are complete, and do not relieve the contractor of the obligation to complete all embankments before disposal.

The actions necessary for unplanned surplus will vary, depending on whether the project already has a planned surplus with available disposal areas or whether the project was planned as a balanced project with no readily available or economically feasible disposal sites. Consider factors such as the location of the surplus within the project and whether the surplus can be disposed of within the right-of-way.

The contractor may place surplus material within or alongside an embankment, between an embankment and a right-of-way line, or in the loops and gores of interchange areas. Remember that such placement is subject to the requirements for constructing embankments. Also, ensure material is not disposed of above the grade of the adjacent roadbed unless the resident engineer specifically issues a written authorization. Select disposal sites that will not interfere with drainage, will benefit future development, and will improve appearance or stability.

When unplanned surplus material can be disposed of within the project, decide whether it will be economically more feasible either to order changes in earthwork immediately or to perform the disposal after all embankments have been completed.

When unplanned material will be removed from the project, immediately begin arrangements for disposal unless planned disposal sites will accommodate the excess. Such arrangements must include a review of environmental agreements to ensure compliance.

Before submitting ordered changes to the contractor, consult with the construction engineer on the proposed disposal of unplanned surplus. Consider disposing the surplus on excess parcels if such disposal will improve the parcels' value.

When appropriate, enter the cost or anticipated cost of disposal in the contract records to produce an accurate contingency balance.

4-1903A (6) Deficiency of Material

When the engineer's analysis of quantities indicates an unplanned deficiency of embankment material, determine whether to make up the shortage by obtaining local borrow, increasing excavation, or by obtaining imported borrow. Make this determination whether or not the contract includes an item of imported borrow. Also, consider factors such as economic feasibility, safety, environmental requirements, and material quality.

Obtaining material from outside the project's limits may require the processing of a "Public Interest Determination." Refer to Section 3-6, "Control of Materials," of this manual for more information about this requirement.

Notify the project manager of any major deficiencies (or surpluses) so that adjustments can be made for future projects.

Keep adequate measurements and records to support payment.

4-1903A (7) Selected Material

The contractor cannot use selected material for any purpose other than that designated unless the resident engineer first determines ample material remains for the planned work.

If it is feasible and economically advantageous to the state, initiate a contract change order to substitute the selected material for planned aggregate subbase.

Do not order the contractor to stockpile the selected material unless stockpiling is planned, economical, or necessary for the movement of traffic.

4-1903A (8) Excessive Ground Water

When excessive ground water is encountered at subgrade, the resident engineer's duties include the following:

- Contact the district hydraulics engineer, geotechnical engineer, or both, to discuss the materials information and the area's known groundwater depths. Also, discuss with these experts any viable alternatives for stabilizing the area.
- Advise the contractor of the situation, and work with the contractor to determine the payment method for implementing the desired alternative.
- Prepare and issue a contract change order, if necessary.

4-1903B Structure Excavation and Backfill

Consider the following when inspecting for both structure excavation and backfill:

4-1903B (1) Structure Excavation

The resident engineer's duties include the following during structure excavation:

- Observe the excavation to ensure that sloping or shoring conforms to the contractor's approved detailed plan or to the sloping or shoring requirements in the *Construction Safety Orders*.
- To anticipate changes resulting from the foundation's condition, periodically inspect the excavation. Remind the contractor of the provisions of Section 19-3.05, "Inspection," of the *Standard Specifications* ," which requires the contractor to notify the engineer when any structure excavation is completed substantially to grade.
- Before fine grading begins, order any necessary additional excavation.
- Enter in the daily report any orders to increase excavation, and enter sufficient data in the appropriate records to support additional payment.
- Pay for additional quantity by measuring such quantity and including it in the appropriate contract records when no extra work is involved.
- Observe fine grading to ensure compliance with requirements for grade and culvert beddings.

4-1903B (2) Structure Backfill

The resident engineer's duties include the following during structure backfill:

- Inspect the backfill to ensure it is brought up uniformly and in the specified layer thickness.
- When slurry cement backfill is used, ensure it is adequately fluid and is placed so that it completely fills the area around the culvert. One of the advantages of slurry cement backfill is that it provides adequate support on the underside of pipes where compaction of ordinary backfill material is difficult. The contractor must avoid "floating" the culvert.
- If backfilling steel culverts, reinforced concrete, or other metal products, ensure the contractor adds only nonchloride admixtures to slurry cement backfill to accelerate the setting time. Chloride-containing admixtures, used to hasten curing, increase the corrosion potential of the steel or reinforced concrete structure. In addition, slurry cement backfill or controlled low-strength material cannot be used as structure backfill for aluminum or aluminized steel pipe culverts.
- Ensure that all conditions described in the specifications are met before permitting "ponding" and "jetting." "Ponding" means flooding the backfill material for a period of time (by erecting dams or dikes) so that water will pond on the material. "Jetting" means forcing water into the layer of backfill material through a small diameter pipe. Ponding alone is not permissible because it does not give uniform or adequate consolidation. Pressure jets must be inserted at the bottom of the backfill material at close, uniform intervals.
- Prohibit the use of any compacting equipment or methods that may displace or damage structures or otherwise adversely affect foundations or adjacent embankments.
- Order compaction tests (except for slurry cement backfill) to ensure compliance with the contract. Also, determine the frequency of such testing, ensuring sufficient frequency to determine compliance with requirements. Determine frequency based on variables such as the nature of the material and the efficiency of the contractor's methods. At the beginning of backfilling, take sufficient tests to establish the amount of effort required to attain the required compaction.
- Ensure the contractor places compacted impervious material where erosion of backfill material or seepage through backfill material may occur. This approach is particularly important at culvert inlets.
- Ensure the contractor places pervious backfill material as specified.
- When imported material is used as structure backfill for metal products such as steel pipe, culverts, or reinforced concrete, the imported backfill must be at least as noncorrosive as the native soil material. Consequently, the special provisions should specify corrosive parameters for the imported fill that are less corrosive than that of the native soil. This requirement applies to imported soil, lightweight aggregate fill, and controlled low-strength material. Contact the Office of Materials Engineering and Testing Services for assistance with corrosion recommendations.

4-1903C Ditch Excavation

Ensure ditches are excavated to the required lines and grades. Require any areas excavated below grade to be backfilled according to the specifications. When ditches are to be lined with concrete or shotcrete, require the contractor to prepare the foundation in accordance with Section 53, "Shotcrete" or Section 72, "Slope Protection," of the *Standard Specifications*.

4-1903D Embankment Construction

The resident engineer's duties include the following during embankment construction:

- As material is placed, ensure the thicknesses of the layers meet specifications. Also, ensure the contractor fills voids between rocks in each layer with earth or other fine material. Record such observations in the daily report.
- Ensure the contractor does not place rocks, broken concrete, or other solid materials larger than 0.1 m in greatest dimension in areas where piles are to be placed or driven.
- During hillside construction or where the section changes from embankment to excavation, ensure that benching into existing material is adequate for proper keying of embankment material to original ground. Decide whether benching should exceed 2 m. If widening eliminates the need for end dumping from above, increase the benching width to provide room for compacting equipment. Advise the contractor accordingly, and measure the additional excavation for payment.
- Observe end dumping, and prohibit its continued use as soon as normal embankment methods can be used.
- Ensure the contractor removes from embankment areas all debris from clearing unless the special provisions allow otherwise. In heavy grading operations, small gullies and canyons may be filled with loose material during pioneering and haul road construction. During this phase, close observation is necessary so that such areas can be recorded for future correction.
- During embankment construction, measure the cross-fall to ensure it does not exceed specifications.
- Ensure embankment slopes comply with specified tolerances.
- Ensure surcharges and settlement periods comply with contract requirements.

4-1903E Compaction

Compaction directly affects the supporting strength of soil. The less the compaction, the lower the supporting power when the material is saturated. The contractor must choose the method for achieving the required compaction, and the engineer must not direct the compaction operation.

The contractor may choose to use wetting agents, provided no detrimental effects result.

The resident engineer's and assistant resident engineers' duties include the following during compaction:

- Measure the compaction to ensure compaction meets specifications. Test at the frequency necessary for control. Take into account the uniformity of the material and the uniformity of the particular operation. Generally, if the operation is uniform and well within specifications, testing frequencies may be decreased. For nonuniform operations, borderline results, or both, increase testing frequencies.

- Observe compaction testing to ensure it complies with contract requirements. Advise testing personnel of the specific limits of the testing area.
- If the contractor chooses to excavate basement material to facilitate compaction, examine the underlying material before the area is backfilled. Decide whether the layer of material below the excavated basement material should be compacted. In general, if sufficient loose material exists to allow settlement of subsequent layers, order compaction of the underlying material by contract change order.

To attain the required compaction, ensure that the contractor sufficiently dries material that contains excessive moisture. Also, ensure that the resulting embankment is firm and stable.

4-1903F Borrow Excavation

During borrow excavation, the resident engineer's duties include the following:

- If necessary, make measurements and also keep adequate records for progress and final payment.
- When material is to be paid for by the tonne, ensure sufficient moisture samples to determine pay quantities.
- Ensure the contractor submits the necessary documents covering possible local material sources. For details, see Section 3-6, "Control of Materials," of this manual.

4-1904 Measurement and Payment

The following measurement and payment information covers roadway excavation, structure excavation and backfill, and ditch excavation.

4-1904A Roadway Excavation

The resident engineer's duties include the following regarding measurement and payment for roadway excavation:

- Usually, the design calculations to determine quantities of roadway excavation are suitable to be incorporated directly into the project records as source documents. Check the accuracy of these calculations. Also check whether slope rounding and quantities for contiguous ditches (as shown in the *Standard Plans*) have been included.
- Before beginning work, check the accuracy of original ground elevations using slope stake locations. It may also be necessary to take field cross sections or run profile lines to check original ground elevations.
- Check the roadway template and subgrade elevations. Include in the project records all documentation substantiating roadway excavation quantities. It should be easy to trace back from the total pay quantity to the source documents.
- When all roadway excavation is complete, reconcile the total quantity with the total of the partial payments. It is important to determine early in the project, and as closely as possible, the total pay quantity for roadway excavation. This early determination, coupled with the periodic adjustment of partial payment totals (as described in the following paragraph), will help prevent overpayment.
- During the work, choose a method to measure roadway excavation quantities for partial payment. One method commonly used is "load count." Load count

4-1904 Measurement and Payment

involves determining daily production by reaching agreement on the capacity of hauling equipment and by using the contractor's daily load tally. To make a preliminary determination of unit capacity, you can use the following methods:

1. Using previous experience
2. Measuring volumes of hauling equipment
3. Weighing a loaded hauling unit and converting results into volume of material in the cut

- As work progresses check actual conditions as frequently as possible. As a single cut is completed, compare volume in that cut to volume represented by load counts from the cut. It may also be possible to cross-section partially completed excavations, calculate work done, and compare the result to load count totals. When these checks indicate over or underpayments, make up the difference in the current partial payment. You may adjust the capacities of hauling equipment so that future partial payments based on load count are more accurate.
- Unless otherwise specified, payment for embankment is included in payment for other items of work. However, the quantities of material in embankments must be known to determine whether a surplus or deficiency of excavated material will exist. On a project involving significant amounts of earthwork, predicting a surplus or a deficiency of roadway excavation should be a primary concern in the early stages and throughout the project. (Refer to the discussion regarding subsidence and grading factors under 4-1903A(5), "Surplus Material" in this section.) During the work, it is just as important to periodically measure the constructed embankment as it is to periodically measure the completed excavation. These periodic measurements are usually the most accurate way to determine the actual grading factor. Whether or not it is important to be able to accurately predict the overall grading factor will depend on the job situation and potential problems associated with developing a surplus or a deficiency of material.
- When the contractor disposes of surplus material, additional haul distances may occur. It may be appropriate to pay for additional hauling cost as extra work. Use a mass diagram as a useful tool for determining haul distances.

4-1904B Structure Excavation and Backfill

To determine methods and limits for calculating structure excavation and backfill pay quantities, review the special provisions, the *Standard Plans*, and Section 19-3.07, "Measurement," of the *Standard Specifications*. For payment clauses, review Section 19-3.08, "Payment," of the *Standard Specifications*. Note that the payment for structure excavation and backfill is included in the payment for some structures and culverts. Before excavation, determine if it is necessary to profile or cross-section original ground in structure excavation areas.

4-1904C Ditch Excavation

To determine whether ditches and gutters are to be paid for as ditch excavation or roadway excavation, review the specifications, plans, and *Standard Plans*.

Measure the pay quantities of ditch excavation using the average end area method. Before excavation, determine if it is necessary to profile or cross-section original ground.

4-1904D Borrow Excavation

Before beginning work, cross-section all borrow areas when borrow is paid for by volume. If it is necessary to change the method of measurement from volume to weight, write a contract change order specifying the conversion factor.

Section 20 Erosion Control and Highway Planting

Section 20 Erosion Control and Highway Planting

4-2001 General

4-2001 General

Erosion control and highway planting is covered under Section 20, "Erosion Control and Highway Planting," of the *Standard Specifications*. Erosion control materials are applied to roadside and median areas where erosion control is necessary and where planting may, or may not, be done in the future. Highway planting (landscaping) involves preparing areas for planting, furnishing and planting plants, and performing plant establishment work. Such landscaping is sometimes combined with erosion control. Irrigation systems are installed to apply water to highway planting.

For questions about the acceptability of materials and work for erosion control and highway planting, resident engineers may consult with landscape architects and landscape specialists in the district.

Note that many new products, materials, and methods used in erosion control and highway planting may not be included in Caltrans contracts. When new products, methods, or materials that meet contract requirements are used, report them to the district landscape architect and to the Office of State Landscape Architecture, using Form LA-16, "Product, Material, or Method Report (For highway Planting or Erosion Control)."

4-2002 Erosion Control

4-2002 Erosion Control

Properly applied erosion control is a key element in preventing water pollution. The success of erosion control work often depends on the time of year that it is applied. Consult with the project landscape architect and landscape specialists if an apparent need exists for changing the order of work or the dates specified for erosion control.

4-2002A Materials

The following information discusses some of the materials used in erosion control:

4-2002A (1) Topsoil

Topsoil is the balance of organic matter, sand, clay, and nutrients necessary to support healthy plant life. For the specifications for topsoil, see Section 20-2.01, "Topsoil," and Section 19-2.07, "Selected Material," of the *Standard Specifications*. Topsoil that contains large percentages of sand and clay or silt-clay or is deficient in organic matter may be a poor medium for growing plants. High sand content tends to promote dry conditions. High clay content limits aeration and drainage. For good plant growth, the soluble salt content of topsoil generally should not exceed 500 ppm. If the topsoil's composition is questionable, laboratory tests can determine the salt content.

Rejected any proposed sources for topsoil if the topsoil has too much clay or sand or the topsoil lacks sufficient organic matter. Evidence of poor weed growth is a good indicator that the proposed topsoil source will not support healthy plant growth. If the proposed topsoil source is questionable, consider obtaining a basic soil test.

4-2002A (2) Commercial Fertilizer

The *Standard Specifications* or the special provisions cover the requirements for commercial fertilizer, which is expressed as percentages of nitrogen, phosphoric acid, soluble potash, and sulfur. Commercial fertilizer may be spread with seed and other erosion control materials using hydroseeding equipment. Commercial fertilizer may also be specified for highway planting.

4-2002A (3) Straw

Straw is the mulch most commonly used to protect slopes and has proven to be an effective method of controlling slope erosion.

Straw provides the following benefits:

- Protects seeded soil from wind, rain, and sun.
- Conserves surface moisture and serves to
- Maintains uniform soil surface temperatures, thereby promoting seed germination and early growth.
- Dissipates the impact of rainfall.
- Slows the velocity of runoff.

4-2002A (4) Fiber

Fiber, as used in erosion control, consists of fine, hair-like tissues processed into small clumps. Natural fiber is derived from wood or other vegetable products.

When properly used, fiber provides the following benefits:

- Protects seed within hydroseeding equipment from the action of centrifugal pumps and the action of discharge through the nozzle.
- Enables more uniform seed distribution.
- Enhances a visual inspection of seed coverage.
- Forms mulch, covering and anchoring seed to the slope.
- When applied with stabilizing emulsion, bonds straw to the slope.
- Enables seed and commercial fertilizer to be applied by hydroseeding in one application.
- Can be applied by means of a hose to slopes not accessible by other mulching equipment.

The most common method of applying fiber is with hydroseeding equipment. Seed, commercial fertilizers, and emulsion, when specified, usually are applied with the fiber and water in one or more applications. Fiber is used primarily as a carrier. It holds seed on slopes where it is not feasible to incorporate or anchor straw.

4-2002A (5) Seed

Minimum seed purity and germination are usually specified for seed. The purity of seed is defined as the percentage of a specified seed in relation to the total quantity, which includes inert matter, weed seed, and other seed. Seed germination is the percent of pure seed that will grow when tested under laboratory conditions. The percentage of pure live seed is the product of seed purity and germination.

Specifications require legume seed to be inoculated. Such inoculation involves combining the seed with viable bacteria appropriate for the species used. Although untreated legume seed may germinate, the resultant seedlings will be stunted and eventually die unless effective bacteria are already present in the soil. However, many soils lack the necessary root nodule bacteria.

4-2002A (6) Stabilizing Emulsion

Stabilizing emulsion may be applied with fiber and fertilizer. The emulsion increases the amount of fiber, seed, and fertilizer that a slope will retain and, therefore, improves the ultimate production of the desired vegetation.

Manufacturers of stabilizing emulsion normally specify the amount of water that must be added to the emulsion. The amount is usually specified as "liters of water to kilograms of solids of emulsion."

4-2002B Before Work Begins

Before work begins, the resident engineer must do the following:

- Review the plans and specifications to determine the specified type of erosion control material and the time of application.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers erosion control materials.
- When native topsoil is specified, examine the topsoil to determine that sufficient quantity is available and that it is suitable for the planned use. For possible solutions if the native topsoil appears inadequate, consult with the project landscape architect or landscape specialists. Ensure that sufficient area exists at the top of slopes to stockpile topsoil.
- When seed must be backed by vendor statements, ensure they are complete and received in a timely manner.
- Erosion control materials are applied at a specified rate of so many kilograms or tonnes per hectare. Be prepared to measure and compute areas to which erosion control is to be applied so that spread rates may be checked during application.
- Examine equipment to be used in erosion control work to determine if it meets specified requirements.

4-2002C During the Course of Work

As materials for erosion control arrive on the project, do the following:

- Through examination, ensure imported topsoil meets the specified requirements.
- To determine if commercial fertilizer meets specifications, check the chemical analysis on the label of the fertilizer bag. This label generally suffices to determine whether the fertilizer meets the requirements.
- In addition to furnishing certified daily summary weigh sheets, require the contractor to furnish weight tickets with each load of straw delivered to the project. Keep records for the mass of straw delivered to stockpiles. These records will facilitate determining quantities for progress estimates and checking spread rates.
- Ensure the receipt of a Certificate of Compliance for fiber. Check the labeling on the package for moisture content. If necessary, sample the fiber and perform California Test 226, "Determination of Moisture Content by Oven Drying."

- Check seed package labels and other required documentation. Calculate the weight of pure live seed in each sack.
- When approving the use of seed with a germination rate lower than the minimum rate specified, application rates must be such that the specified amount of pure live seed is used. Before approving a lower germination rate, consult with the district landscape architect.
- Ensure that legume seeds are inoculated as required in the specifications and that the required time limits are met.
- Ensure the receipt of a Certificate of Compliance for stabilizing emulsion. When stabilizing emulsion comes in powdered form, the actual mass of the powdered stabilizing emulsion will be the mass of the solids to be paid for. When the emulsion comes in liquid form, determine the percent of solids in the stabilizing emulsion by testing it as required by the *Standard Specifications*.

During the application of erosion control materials, take the following actions:

- Ensure the contractor prepares areas to receive erosion control as required in the specifications.
- Ensure topsoil is spread uniformly to the required depth by measuring the depth. Ensure the contractor loosens any compacted topsoil.
- Ensure the contractor applies erosion control materials in the specified sequence.
- Observe the spreading and incorporating (when required) of straw. A good method to use in determining spread rates is to count bales and use average bale weights. If the contractor applies the straw pneumatically, suspend the operation if wind conditions cause the straw to be blown onto private property or public roadways.
- Observe the amounts and proportions of materials spread or entered into the hydroseeder. You may use sack counts and weights to determine the weights of seed, stabilizing emulsion, fiber, and commercial fertilizer.
- Compute and record the spread rates of the various materials applied. For each day of operation, compute and record the spread rates at least once.

4-2002D Measurement and Payment

From the weight shown on the certified scale sheets, deduct any leftover straw not used in the work. If a “weigh back” certified weight is not available, you may use bale counts and average bale weights for this purpose. Deduct the weight of any excess moisture as determined by California Test 226, “Determination of Moisture Content by Oven Drying.”

To determine pay quantities, you may use sack counts and sack weights. Make accurate counts, and record them in the project records.

Determine the pay quantity of live seed using the germination and purity rates of the bulk seed.

4-2003 Highway Planting

For the specifications related to highway planting, see Section 20-4, "Highway Planting," of the *Standard Specifications*. Highway planting consists of preparing areas for planting, applying pesticides, and furnishing, planting, and maintaining plants.

4-2003A Materials

The following provides some general information on various materials used for highway planting:

4-2003A (1) Soil Amendment

For the requirements for soil amendment, refer to the *Standard Specifications*. The special provisions may specify the type of material to be used. For the quantities, see the plans in the Plant List and Planting Specifications chart or the special provisions.

4-2003A (2) Iron Sulfate

Iron sulfate consists of iron and sulfur. Some soils lack iron, one of the micronutrients needed for the proper formation of chlorophyll. Iron sulfate is used both to correct soils deficient in iron and to lower the pH of the soil. It makes the existing iron more readily available for plants.

4-2003A (3) Lumber

Lumber, as described in the specifications, is used for header boards to define landscaped areas.

4-2003A (4) Plants

The contract plans will specify the types and sizes of the plants to be used on a given project. If a particular plant type is unavailable from any of the contractor's nursery sources and a change is proposed, seek a recommendation of approval from the project landscape architect, who will need to review the proposal.

4-2003A (5) Foliage Protectors

Foliage protectors protect newly installed plants from animals or rodents interested in foraging the various above-ground parts of the plants. Eventually, as the plants grow larger, the need for foliage protectors decreases. On some projects with lengthy plant establishment periods, the specifications may require the protectors be removed before contract acceptance.

4-2003A (6) Root Protectors

Wire mesh root protectors serve a similar purpose as the foliage protectors, providing below-ground protection from burrowing rodents. The specifications require removing galvanizing from the wire mesh. Such removal facilitates the decomposition of the wire mesh in the soil and allows plant roots to grow through the wire mesh without being girdled or restricted. By the time wire mesh decomposes, the plant is usually large enough to withstand some root damage by rodents.

4-2003A (7) Mulch and Compost

Mulch is used in many situations on various construction projects. Applications may vary from simple installations within plant basins to larger areas as a ground cover within mass planting areas until the plants fill in and cover the ground. On some projects, mulch may be used as part of an approved water pollution control plan. Mulch has the following benefits:

- Retains soil moisture to assist in healthy plant development
- Acts as a weed barrier
- Aids in the prevention of surface erosion

Section 20-2.08, "Mulch," of the *Standard Specifications*, specifies the materials and size requirements for mulch. Ensure the receipt of a Certificate of Compliance for mulch.

4-2003B Before Work Begins

Before work begins, the resident engineer must do the following:

- To determine the requirements for highway planting, review the plans and specifications.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers highway planting materials.
- Check for planting areas where little or no weeds are growing because the lack of weeds may indicate sterile ground. Ask the maintenance landscape specialist if any planned planting areas were sterilized. If certain areas were sterilized, find out when the sterilization occurred, what chemicals were used, and what the rates of application were. For corrective measures, request assistance from the project landscape architect or the maintenance landscape specialist.
- Take photographs of existing site conditions, especially where you find evidence of sterile soil and damaged facilities.
- Invite the district landscape architect or project landscape architect and the maintenance landscape specialist to visit the site. Review the areas to be planted, and verify the limits and work involved in roadside clearing. Discuss any unusual features or potential problem areas.
- Ensure the contractor is aware of any special requirements, particularly any facilities or plants that must be preserved and protected.

4-2003B (1) Pesticides

Before any work using pesticides begins, the resident engineer must do the following:

- Review the specifications covering pesticide use.
- Review the guidelines for pesticide use contained in Chapter C2, "Vegetation Control," of the Caltrans *Maintenance Manual*. These guidelines can also be applied in a general way to contract work.
- Obtain and review a copy of the contractor's recommendations for pesticide use, as submitted to the contractor by a licensed pest control adviser. For assistance, you may call the maintenance landscape specialist, who is an expert in this area. Ensure the recommended pesticides are limited to those specified in

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 deport.
  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.

4-2003C During the Course of Work

Use the following guidelines to ensure highway planting complies with the plans and specifications:

4-2003C (1) Roadside Clearing

Roadside clearing includes removing trash and debris, killing, removing, or mowing weeds and other vegetation, and controlling rodents. During roadside clearing, the resident engineer must do the following:

- Give due consideration to the requirements for water pollution control. It may be desirable to leave some vegetation on the slopes to reduce the potential for storm water pollution during the rainy season.
- Ensure the contractor removes stumps and large roots to the depth specified. Check areas to be planted to ensure they are free of living weeds at the time of planting.
- Gophers are among the rodents requiring control. Evidence of gophers includes surface mounds left from their nighttime tunneling when the gophers eat plant roots and chew on irrigation wires. Their burrows can damage plant basins. Baiting and trapping are the methods used to control gophers. Some counties have rodent abatement programs and will give expert advice upon request. For information, contact the maintenance landscape specialist.

4-2003C (2) Pesticides

During pesticide use, the resident engineer must do the following:

- Observe the mixing and applying of pesticides to ensure these processes comply with the approved recommendations and specifications. Ensure that workers applying pesticides wear protective clothing, including eye protection. A person with a pesticide applicator's license must be at the site. However, the person spraying the chemicals does not need a license. Include notes about the pesticide application in the daily report
- Provide the contractor with Form LA-17, "Report of Chemical Spray Operations."
- Obtain a completed chemical spray report from the contractor each week. Retain one copy in the project files, and forward other copies in accordance with district procedures.
- Early enough in the contract so a good weed kill can be obtained, ensure the contractor has applied the specified pesticide to problem weeds, such as Bermuda grass.

4-2003C (3) Preparing Planting Areas

After roadside clearance, irrigation system installation, trench testing and backfilling, the preparation of planting areas begins. During this preparation, the resident engineer must do the following:

- Using the plan sheets for plant layout, ensure the location for plants and the perimeter of ground cover areas are designated with gypsum, small wire-mounted flags or other suitable markers. The contractor must furnish the labor, materials, and transportation for placing stakes or other suitable markers to indicate the designated locations. This phase of designating locations is when necessary changes can be made with the least inconvenience and cost to the contractor or to Caltrans.

- When establishing plant locations, ensure compliance with the guidelines in Chapter 900, "Landscape Architecture," of the *Highway Design Manual*, which contains planting design standards.
- Ensure plant locations meet the minimum setbacks from the traveled way, pavements, fences, walls, and ditches, as shown on the Plant List and Planting Specifications chart in the contract plans. However, plant locations on the ground do not need to match the plans exactly. The contractor may need to adjust the locations of shrubs and trees for proper setback from the traveled way. Whenever possible, also avoid extremely rocky or poorly drained areas, old roadbeds, sign locations, and utility lines. Keep in mind the intended purpose of the planting, and visualize the size, shape and characteristics of the mature plants. Select locations so branches of mature plants will not extend into the roadway or over a right-of-way fence.
- If cultivation will be required, the plans or special provisions will say so.
- Ensure the soil is loosened to the specified depth, and prohibit rubber-tired equipment on cultivated areas.
- When rocks are encountered in an area of predominantly fine native materials, most rocks larger than 65 mm should be removed. In predominantly rocky areas, consult with the project landscape architect for alternatives to removing rocks.
- If rocks need to be removed, prepare a contract change order to pay for disposal. Consider using the rocks at drainage outlets or other areas to prevent erosion.
- To support payment, maintain adequate records of cultivation. When the contract item for cultivation includes payment for soil amendments and fertilizer, ensure these materials are incorporated at the specified rates. Note your observations in the daily report.

4-2003C (4) Header Boards

Measure header boards, and ensure they are installed as the contract requires. Ensure that nails, lag screws, and hardware are galvanized and that lumber is of the specified quality.

4-2003C (5) Planting

Inspect the planting operation, and ensure the requirements specified in the plant list are met for the following:

- Hole size
- Basin type
- Iron sulfate
- Soil amendment or fertilizer
- Mulch
- Plant stakes, if required

Observe the general planting operation to ensure the following:

- No more plants are distributed along the roadside than can be planted and watered on the same day.
- Containers are not cut until delivered to the planting area.

- Roots of plants not in containers remain covered and moist.
- Before transporting the plants to the planting area, nursery stakes are removed from the plants at the project site.
- Before ground cover is planted, trees and shrubs for such areas are planted, watered, mulched, and staked (if required).

For ground cover, make sufficient observations to ensure the following:

- Cuttings are placed to the required depth.
- The soil is moist at the time of planting.
- Plants are watered as specified.
- The specified spacing is provided.

Also, the resident engineer must do the following during the course of planting:

- Note all observations, including any pertinent instructions given to the contractor, in the daily report.
- Before planting in holes or trenches, ensure the contractor has prepared backfill and has applied water as specified. Before backfill is tamped down, ensure the plants are straight in their holes.
- Review planted areas to ensure plants have been staked and tied in the specified manner.
- Mulch, if required, must be placed as soon as possible after planting. It will help to retain moisture and discourage weeds. Ensure the removal of wood chips that are longer than the specifications allow. Keep mulch away from drainage channels and away from plant stems. Postpone placing mulch in extremely wet weather when trampling the areas would compact the soil and the mulch would hold excessive moisture around the plant.
- Decide on test areas for counting plants as specified. Prepare adequate records for progress payments.
- When it is obvious that plants will not survive or will be damaged severely due to weather, consider allowing a delay of planting until a more favorable period. If planting, delayed because of unfavorable weather conditions, is the controlling operation you may grant nonworking days in accordance with Section 8-1.06, "Time of Completion," of the *Standard Specifications.*

4-2003C (6) Watering

For watering, the resident engineer must do the following:

- Ensure the contractor applies sufficient water so the plants will develop properly. Too much water, improperly applied, can cause damage. Factors such as weather, soil, and plant type determine the amount of water and frequency of application.
- Beginning with the initial watering, closely check the amount of water applied and the manner in which it is applied. Most plants should be watered immediately after they are planted. Do not allow initial watering to be delayed until the following day.

- To ensure watering requirements are met, periodically observe planted areas after initial watering.
- Ensure the irrigation system distributes water evenly. To ensure proper coverage and to ensure water does not reach the traveled way, routinely check the sprinklers' water distribution.

4-2003C (7) Replacement

A plant need not die before the contractor replaces it. Ensure the contractor replaces any plants that have been injured or damaged sufficiently to render them unsuitable.

When a replacement plant obviously will not survive because of weather or other predictable causes, consider delaying replacement until a more favorable time.

To substitute an alternative species, seek authorization through a contract change order and obtain concurrence from the project landscape architect.

4-2003C (8) Plant Establishment Work

The objective of plant establishment is to ensure that, before contract acceptance, plants are healthy and established and the irrigation system works as planned.

Caltrans has two categories of plant establishment, described as follows:

- Type 1, which is normally used on projects where highway planting is a major portion of the work.
- Type 2, which is used on projects where highway planting is incidental to other work.

Plant establishment consists of caring for the project as specified. Establishment work begins with each plant after it is planted and watered for the first time. Therefore, new highway planting must be properly maintained both before and during plant establishment. During the course of plant establishment, the resident engineer must do the following:

- When it is necessary to replace poorly cared for plants, order replacement promptly. However, do not allow replacement as a substitute for proper maintenance. A plant that was planted earlier and maintained for a longer period of time will be more developed and will require less maintenance upon completion of the contract than one planted late in the plant establishment period.
- Ensure the contractor follows specifications requiring plants and planted areas to be well watered. The words "well watered" mean more than just enough water to keep a plant alive. It is intended that the plant will flourish during plant establishment. Once the root systems become established, watering can be reduced.
- Ensure the contractor maintains sufficiently formed basins around each plant to permit the ponding of irrigation water and to provide ample room for the required mulch. During wet weather, the contractor may need to create temporary openings in the basin walls to drain excess water from the plants.
- Ensure the contractor controls weeds as specified. Without weed control, the weeds' rapid growth will reduce the availability to the plants of moisture and nutrients in the soil. If plants have to compete with weeds for moisture, nutrients, and sunlight, they will not develop properly.

- Within basins or header boards and adjacent to fences, ensure ground cover is removed from paved areas, as specified.
- From roadside clearing and planting areas, ensure the contractor removes surplus earth, paper, trash, and debris, as specified.
- Ensure commercial fertilizer is applied at the specified time, in the required amounts, and in a workmanlike manner. Prohibit the concentration of commercial fertilizer at the base or stem of the plant; otherwise, injury to the plant will result.
- Require the contractor to give instructions on the use and adjustment of the irrigation controllers as required in the specifications. Invite the appropriate landscape maintenance personnel to the instructional session.
- When all work except plant establishment is complete, require the contractor to remove construction area signs. If appropriate, use temporary traffic control signs during plant establishment work.

4-2003C (8a) Administering plant establishment time requirements:

In administering the time requirements for plant establishment, the resident engineer must take the actions below.

- Notify the contractor of the beginning of the plant establishment period. On Form CEM-2701, "Weekly Statement of Working Days," under "Remarks," note the date of the first day of the plant establishment period.
- During plant establishment, credit the contractor with one plant establishment working day for each day except Saturdays, Sundays, and legal holidays when plant establishment work is satisfactory.
- Ensure that all required work is complete before beginning to give credit for plant establishment working days.
- Judge carefully when deciding whether or not to give credit for a plant establishment day. Base the decision on whether the planted areas are maintained as specified. When necessary, order corrective work in writing. If the contractor does not correct deficiencies within a reasonable period, do not give credit for plant establishment days. In most cases, you may consider a response time within two weeks as reasonable. For normal conditions, order corrections no more often than once each week. Whenever progress is being made toward correcting deficiencies, allow credit for plant-establishment working days. However, when deficiencies appear faster than they are corrected, prohibit credit.

4-2003C (8b) Tracking time for Type 1 plant establishment:

For Type 1 plant establishment, the contractor must complete all work except plant establishment before the plant establishment period begins. Only plant establishment may be in progress during the plant establishment period. The special provisions require plant establishment to be performed satisfactorily for a specified number of working days.

Until plant establishment begins, track contract time on Form CEM-2701, "Weekly Statement of Working Days," in the normal manner. After plant establishment begins, continue filling out the upper part of the form as before. Show all days except Saturdays, Sundays, or legal holidays as working days, regardless of weather or other conditions. Track the progress of plant

establishment under "Remarks" in the manner similar to that shown for Type 2 plant establishment shown in the sample weekly statements of working days in Example 3-8.6 and Example 3-8.7 in Section 3-8, "Prosecution and Progress," of the *Construction Manual* (manual). Credit all working days as plant establishment days except for days on which the contractor fails to satisfactorily perform plant establishment.

4-2003C (8c) Tracking time for Type 2 plant establishment:

Two time limits are specified for projects with Type 2 plant establishment. An amount for liquidated damages is also specified for each time period. The following are the two time periods:

- The number of working days for all work except plant establishment.
- The total number of working days for all contract work, including the plant establishment period.

For Type 2 plant establishment, the contractor must complete all highway planting before plant establishment begins. In addition to plant establishment, other contract work may be in progress during the Type 2 plant establishment period.

For examples of how to track contract time when both time periods are running concurrently, see Example 3-8.6 in Section 3-8, "Prosecution and Progress," of this manual. Show the "working days specified in the contract" as the number of days specified for all work except plant establishment. Fill in the weekly statement in the normal manner, and track the progress of plant establishment as shown under "Remarks."

Example 3-8.7 in Section 3-8 shows the method of tracking contract time and plant establishment days after the contractor has completed all work except plant establishment. After all work except plant establishment has been completed, show the "working days specified in the contract" as the total number of days specified. In the last weekly statement occurring while work other than plant establishment is in progress, record any overrun in contract time for the shorter contract time period.

4-2003D Measurement and Payment

The specifications may specify that highway planting be paid for as a single lump sum contract item or as individual contract items. Resident engineers and assistant resident engineers must carefully determine the methods for measurement and payment for each element of highway planting.

When highway planting is paid for as a single lump sum contract item and the special provisions specify a "cost breakdown," ensure the contractor submits the required information. Until you have approved the cost breakdown, do not make partial payments for highway planting. Use the cost breakdown to determine payment for increases and decreases in the units of work within lump sum contract items for highway planting.

When a lump sum contract item is used for payment, you will usually need to measure some of the units of work performed to verify the contractor completed the planned work. Record these units of work in the project records. As an example of the need to measure a unit of work included in a lump sum item, the designer may include ground cover in the lump sum contract item for highway planting. The plans will indicate the number of cuttings to be planted in each area. You must ensure and document that the correct number is planted by measuring the cuttings as specified in Section 20-4.09, "Measurement," of the *Standard Specifications*, and recording the result in the daily report.

When a single lump sum contract item is used, you should not need to measure items such as pipe for supply lines, as long as the plan remains unchanged. However, you must measure and record quantities of items such as plants, fertilizer, and mulch.

When individual contract items are used, measure quantities in accordance with the specified methods.

4-2004 Irrigation Systems

4-2004 Irrigation Systems

Irrigation systems may be manual or automatic, as specified in Section 20-5, "Irrigation Systems," of the *Standard Specifications*. The special provisions may require the installation of radio equipment that can communicate with a centrally located computer and radio base station.

4-2004A Components of Irrigation Systems

The following are the major components of an irrigation system:

4-2004A (1) Water Meter

The water meter measures the quantity of water delivered to the project. The water may be from a local water district providing domestic potable water or reclaimed water from a water treatment facility.

4-2004A (2) Backflow Preventer

The backflow preventer protects the domestic water system from contamination by preventing water within the irrigation system from siphoning back into the domestic water supply. All domestic water irrigation systems are required to have backflow prevention. The backflow preventer is installed downstream from the water meter in a domestic potable water system.

4-2004A (3) Wye Strainers

Wye strainers filter solid particles from irrigation water. They are installed as part of backflow preventer assemblies and at other locations in the supply lines.

4-2004A (4) Main Supply Line

The main supply line is installed downstream from the water meter and backflow preventer. The supply line carries water under pressure to quick coupling valves and the remote control valves.

4-2004A (5) Master Remote Control Valve

The master remote control valve is located downstream from the backflow preventer. Its purpose is to control the flow of water to supply lines so that they are not under constant pressure when irrigation is not taking place. The master remote control valve is activated when any remote control valve is activated.

4-2004A (6) Remote Control Valves

Remote control valves control the flow of water to the lateral water supply lines and sprinklers. When not operating, they are closed. Remote control valves are usually grouped for ease of maintenance.

4-2004A (7) Quick Coupling Valve

A quick coupling valve is used to attach a hose to the irrigation system.

4-2004A (8) Gate Valve

Gate valves are manually operated to shut off water to allow repairs or modifications to the irrigation system.

4-2004A (9) Lateral Supply Line

Lateral supply lines are pipes that carry water between the remote control valves and the sprinklers. Lateral supply lines are only under pressure when the remote control valve is open.

4-2004A (10) Emitters and Sprinklers

Emitters are watering devices used with drip irrigation systems. They require additional filtration of the water being used in the system because they are easily clogged. Because they apply water at a slow rate, potential erosion of the plant basins is almost nonexistent. Requirements for emitters will be included in the special provisions and on the plans. The plans will specify flow rates and operating pressures for emitters. Sprinklers apply water in a spray pattern to the soil around plants. The special provisions and the plans specify the sprinklers by type, pattern, material, and operating characteristics. Emitters and sprinklers are installed on the lateral supply line.

4-2004A (11) Filter Assembly Unit

Filter assembly units prevent small particles from clogging sprinklers or emitters.

4-2004A (12) Irrigation Crossovers

Irrigation crossovers consist of conduit and pipe used to carry irrigation water under roadways. They are often installed as part of a highway construction project before the highway landscaping project begins.

4-2004A (13) Irrigation Controllers

Electrically operated irrigation controllers supply low voltage to activate the remote control valves. The controllers may operate on 110-volt electrical circuits, batteries, or solar power. Irrigation controllers are placed inside heavy-duty metal enclosures bolted to concrete pads.

4-2004A (14) Electrical Conduit, Pull Boxes, and Conductors

These electrical components of the irrigation system supply electrical power to operate irrigation controllers and valves.

4-2004B Before Work Begins

Before the irrigation system is installed, the resident engineer must do the following:

- Verify the receipt and proper distribution of Form CEM-3101, “Notice of Materials to be Used,” which lists all irrigation system materials.
- When existing irrigation systems are to be maintained, review the systems with the appropriate landscape maintenance personnel. Check existing systems for proper operation and state of repair.

- Review with the contractor the requirements for maintaining existing irrigation systems. When Caltrans maintenance forces are involved, ensure that the contractor and Caltrans maintenance personnel are aware of each other's responsibilities.
- For correspondence with the serving utility companies, contact the project landscape architect. Ensure that, when Caltrans must do so, all orders for water and electrical service have been placed with the serving utility. If services have not been completed, check service points and meter locations with the field representative of the serving utility. Verify the availability of water in the quantities and the pressure required for the irrigation system.
- Verify with the appropriate district unit the availability of any specified state-furnished material.
- As required by Section 20-5.027B, "Wiring Plans and Diagrams," of the *Standard Specifications*, obtain from the contractor working drawings of wiring plans for the electrical portions of the irrigation systems. Ensure that the manufacturer of the controller has approved the wiring plans. Also send the plans to the district landscape architect for review. After review and approval, forward a copy to the contractor with the following written statement:

"The plans are approved pursuant to Section 5-1.02, Plans and Working Drawings," of the Standard Specifications."

- The Office of Structure Design's Office of Electrical, Mechanical, Water and Wastewater usually designs the more complex electrical and mechanical work, such as pump installations. Contact that office to arrange for periodic inspections of the work as it progresses.
- Inspect irrigation system materials as they are delivered to the project site. For most irrigation system materials, the Office of Materials Engineering and Testing Services (METS) will assign responsibility for this type of inspection to the resident engineer. Ensure the contractor furnishes certificates of compliance, when required. For all material not inspected and released by DMETS, inspect the material for contract compliance and complete Form CEM-4102, "Material Inspected and Released on Job." File the form with the project records.
- Before doing any other irrigation work, locate existing conduits to be used as part of a new irrigation system. Determine the locations using as-built plan information, physical evidence such as Type A pavement markers, and metal detectors. After you have determined the locations as closely as possible, require the contractor to excavate and backfill exploratory holes. Process a contract change order, if necessary, to pay for additional exploration in accordance with Section 20-5.03B, "Conduit for Irrigation Crossovers," of the *Standard Specifications*. After the ends of existing conduits for irrigation crossovers are exposed, examine them for damage. Ensure the conduits are free of obstructions. Process a contract change order to pay for any necessary repair or replacement.
- Check the planned location of valves, sprinklers, and automatic controllers and, if necessary, make the following revisions:

  1. Move sprinklers and valves away from areas adjacent to shoulders, where public traffic could damage them.

2. Locate irrigation controllers behind guardrail or at other locations where they will be protected from public traffic.
3. Locate sprinklers away from signposts, existing trees, or other obstructions affecting coverage.
4. Locate sprinklers to obtain full coverage without overspray.
5. Locate sprinklers so that irrigation controllers and pump housings are not soaked.
6. Locate irrigation controllers and backflow preventers within a reasonable distance from safe and legal parking. Also locate them in high visibility areas to deter vandalism.

- When the irrigation lines are laid out and before trenches are backfilled, schedule a meeting on the project site to meet with the project landscape architect. This meeting provides an opportunity to look at the overall layout of the landscape system and make any desirable changes.

4-2004C During the Course of Work

Use the following guidelines to ensure the various components of irrigation systems are installed and constructed as required:

4-2004C (1) Water Lines and Conduit

During the course of installing water lines and conduit, the resident engineer must do the following:

- Inspect the installation and location of backflow preventers to ensure they conform to the requirements of local codes and to the plans and specifications. Pay particular attention to the installation of gate valves and unions on each side of the backflow preventer.
- To protect soil from eroding, ensure the contractor directs the outlets of the wye strainer or pressure relief valve toward the concrete pad.
- Observe trenching and the placement of conduit and pipe. Make measurements to determine that pipe and conduit are installed at the specified depths and setbacks.
- Ensure the contractor does not use excessive water when jacking or drilling conduit. Excessive water is any amount that would damage the roadway or create future maintenance problems.
- When rocks or other debris are brought to the surface during trenching operations decide whether such material should be removed. Base the decision on the same factors considered when preparing planting areas, as previously covered in Section 4-2003C(3), "Preparing Planting Areas" in this section. However, whether or not you order rock removal, the contractor must protect the pipe from sharp objects and must not place rocks directly on, under, or around the pipe. Ensure the contractor backfills in the specified manner, and make notes in the daily report of all inspections.
- When rocks must be removed, prepare a contract change order to cover payment, and keep the required extra work records.
- If excavated material is not suitable for placing around the pipe, prepare a contract change order to pay for supplying and placing a clean bedding material.

- Trench widths must be such that plastic pipe that is not connected by rubber type fittings can be snaked. Snaking means placing the pipe in an undulating line to provide for expansion and contraction.
- For installing plastic pipe supply lines, thrust blocks, plastic pipe irrigation lines, and fittings, obtain a copy of the manufacturer's instructions from the contractor. Observe the installation to ensure the contractor completes it according to those instructions.
- Where supply lines or conduits are installed through existing paved areas, advise the contractor of acceptable replacement material. Ensure the contractor performs such replacement.
- Ensure the contractor installs dielectric couplings or bushings as specified where two dissimilar metals, such as galvanized steel and brass, are joined.
- For solvent cement welding of plastic pipe, obtain the manufacturer's printed instructions from the contractor. Ensure the contractor completes solvent cement welding according to those instructions. For plastic pipe joined with solvent or glue, good workmanship includes immediately wiping off excess solvent or glue from the pipe. When left exposed on the surface, such material will cause rapid deterioration of the pipe.
- Ensure the contractor places the specified pavement markers to show the location of crossover conduits.
- Observe whether unattached ends of pipes, fittings, and valves are plugged or capped pending attachment of additional pipes or fittings. Use judgment in ordering compliance, but as a minimum, expect all such plugs or caps to be in place at the end of each workday.
- Ensure the contractor tests all pipe supply lines for leakage as specified. To hold water lines in place, partial backfill is usually allowed during testing as long as all fittings are left uncovered. Observe the testing, and note in the daily report the time when the pressure test on any segment of the irrigation system begun and the results of this test. The contractor must locate and repair any leaks and repeat the test as many times as necessary.
- After backfilling and ponding or jetting, examine trenches. Require the contractor to refill trenches that have settled below the level of the surrounding area.
- Ensure the contractor tests backflow preventers as specified. File the test results in the project records.
- Observe the operation of the entire irrigation system. Before planting work begins, ensure adequate coverage. If coverage is not adequate to water the planting areas, consider ordering revisions. Be aware that the valves and pipes are designed to accommodate a certain flow at a certain pressure. If the contractor adds sprinklers or increases the sprinkler nozzle size, coverage of each sprinkler will be reduced. If necessary, prepare and process a change order to make revisions to the planned irrigation system.
- Ensure the contractor replaces any existing plants that are removed or damaged during installation of the irrigation system.

4-2004C (2) Electrical Installations

During the course of installing water lines and conduit, the resident engineer must do the following:

- Observe the installation of sprinkler control crossovers to ensure they comply with the size and type specified. When specified, ensure that pull wire or pull rope is installed.
- Ensure that electric service installations conform to the plans and specifications. Consult with district electrical specialists.
- Ensure that controllers are installed as specified. For each type of controller, obtain the maintenance and operations manual. Give the manual to the maintenance landscape supervisor responsible for the irrigation system after contract acceptance.
- Ensure the contractor places a schematic wiring diagram and irrigation as-built plan in the controller enclosure as specified. The inspection date and expiration date for the guarantee must be marked on the inside face of the controllers.
- Observe the installation of conduit, conductors, and pull boxes to ensure compliance with the specifications.
- After trench backfilling to the required depth, observe the specified testing of conductors. Record the results of tests in the daily report.
- Before the beginning of plant establishment, witness a satisfactorily completed, functional test of the irrigation system. Advise the contractor of the lengths and frequencies of the cycles to be used during the functional test. Record the test results in the daily report.

4-2004D Measurement and Payment

The specifications may require irrigation system work to be paid for as a single lump sum item or as individual contract items.

When a single lump sum item is used for payment and the special provisions specify a “cost breakdown,” ensure the contractor submits the required information. For completeness and accuracy, review the cost breakdown. Until you have approved the cost breakdown, do not make partial payments for irrigation system items. Use the cost breakdown to determine payment for increases and decreases in the units of work within lump sum contract items for highway planting.

When irrigation system work is paid for as individual contract items, use the methods of measurement specified for each contract item.

Section 22 Finishing Roadway

Section 22 Finishing Roadway

4-2201 General

4-2201 General

The contract item known as "finishing roadway" provides payment for the final cleanup operation so that the completed project, upon acceptance, will be neat, presentable, and functional, as required by the *Standard Specifications*. This contract item does not require any specific construction work to be performed, but it does involve the performance of numerous small details.

The contract item includes such operations as grading slopes and contour areas to remove vehicle tracks, obliterating haul roads, removing debris from the pavement, cleaning out culverts, cleaning culvert markers, guideposts, and signs.

The *Standard Specifications'* requirement that the entire roadway and right-of-way be left in a neat and presentable condition implies that the contractor must pick up trash and debris on the entire right-of-way. However, this requirement does not mean that Caltrans can require any clearing or grubbing work outside the limits indicated in the *Standard Specifications* unless these limits are modified in the special provisions. In other words, any brush, structures, foundations, old slabs, or logs in the area outside of the clearing limits will be removed at Caltrans expense, if required.

Although not specifically mentioned in the *Standard Specifications*, the contract item also includes removing stakes and lath used for construction, which present an unsightly appearance.

4-2202 Before Work Begins

4-2202 Before Work Begins

Before work begins, take the following steps:

- As portions of the work near completion, review the site and begin noting items of finishing roadway to be performed.
- To be economical and help prevent delays in completing the contract, encourage the contractor to finish work as it progresses.

4-2203 During the Course of Work

4-2203 During the Course of Work

During the work, take the following steps:

- Ensure the finishing operations do not result in material stockpiling on or drifting across the finished pavement.
- Keep a list of the cleanup details, and add to and subtract from the list as new details develop or are completed. During the project's latter stages, when final cleanup operations can normally begin, give the contractor a written details list so the contractor can plan to complete them in an orderly and efficient manner. Do not wait until the date the contractor requests contract acceptance before pointing out these details.

- If the contractor requests relief from maintenance and responsibility, as provided in Section 7-1.15, "Relief from Maintenance and Responsibility," of the *Standard Specifications*, ensure the contractor has completed all the finishing roadway details.
- Ensure measures for permanent erosion control are installed as soon as finishing roadway activities are completed.

4-2204 Measurement and Payment

4-2204 Measurement and Payment

In the daily report, record the activities the contractor performs to complete the finishing roadway item. Carefully segregate the finishing roadway work from the work required to complete other items of work.

Section 24 Lime Stabilization

Section 24
Lime Stabilization

4-2401 General

4-2401
General

Lime stabilization increases the stability of native materials. It is particularly effective for materials containing a large percentage of clay particles. Lime stabilization results from spreading lime over the native material and thoroughly mixing it in place. The specifications also allow off-site mixing. The special provisions specify the amount of lime to be added to the native material. If necessary, to achieve the compressive strength designated in the special provisions, the resident engineer may order an adjustment in the percentage of lime to be used.

4-2402 Before Work Begins

4-2402
Before Work Begins

Before work begins, take the following steps:

- Obtain samples of the materials to be treated. Request the district materials unit to run initial tests to determine the amount of lime required to meet the design criteria. Advise the contractor of the percent of lime required.
- If necessary, obtain samples of the water that will be mixed with the soil and lime, and test the water for compliance with the specifications. Generally, potable water will meet the specification requirements.
- Observe the preparation of the material that will be treated. Ensure the material is scarified and thoroughly broken up to the width and depth specified. Make notes of such inspections in the daily report.
- If necessary, prepare a contract change order to provide for the removal and disposal of any oversized material.
- Prohibit lime stabilization when the ambient temperature is below, or expected to fall below, the specified temperature.

4-2403 During the Course of Work

4-2403
During the Course
of Work

Once work begins, do the following:

- Ensure the preparation of the material that requires stabilizing conforms to the requirements in Section 24-1.04, “Preparing Material,” of the *Standard Specifications*.
- For each delivery of lime, obtain the Certificate of Compliance and the certified copy of mass. Obtain samples of the lime at the frequency rate shown in Section 6-1, “Sampling Types and Frequencies,” of the *Construction Manual*.
- Observe the spreading of the lime to determine that the equipment and method used meet the specified requirements.

- Check the spread rate of the lime. When dry lime is spread, the rate of spread may be checked by either of the following means:
  1. Placing building paper on a section before spreading and then weighing the material from a known length of spread (2 to 3 m)
  2. Weighing the distributor before and after spreading a known length
- When lime is spread in a slurry, the rate is normally checked by either of the following means:
  1. Weighing the spreader before and after spreading
  2. Determining the volume of slurry spread for a known length and reducing the resulting value to the weight of lime
- Prohibit any method of spreading lime that precludes determining the spread rate. Record daily spread rates, both spot-check and overall, in the daily report.
- Decide how far ahead of the mixing operation the lime may be spread and advise the contractor accordingly. Base the decision on the variables involved in each particular situation. The contractor must not spread the lime so far ahead of the mixing operation that wind would blow it away. Neither must lime in a slurry form be spread so far ahead of the mixing operation that it would dry before being mixed.
- After the spreading of the lime and until the end of the specified curing period, prohibit any traffic, except equipment performing the work, to pass over the native material.
- When the lime and the material to be stabilized are mixed off-site, ensure the contractor complies with the same requirements for moisture content, thoroughness of mixing, thickness, compaction, and grade tolerance. Require the contractor to trim loose material from transverse and longitudinal construction joints before placing freshly mixed material against them.
- During the mixing operation, sample and test the material to ensure the moisture content exceeds the optimum required for compaction.
- Ensure rolling equipment meets specifications.
- Make necessary measurements to ensure the thickness of each compacted layer conforms to the specifications. Note the results of such measurements in the daily report.
- Test the mixture with a phenolphthalein alcohol indicator. If the reaction produces a nonuniform color, require the contractor to perform additional mixing.
- Ensure the depth of mixing meets the required thickness of the stabilized material.
- Ensure the contractor completes all mixing within the specified time.
- After final mixing, ensure compaction begins within the specified time.
- To determine maximum density, obtain samples of the mixed material, and test the material before initial compaction.
- Test for compaction in accordance with Section 24-1.07, “Compaction,” of the *Standard Specifications*.

- Order trimming of any material above the grade tolerance, and ensure subsequent rolling is performed.
- Ensure the compacted surface is kept moist until the placement of a subsequent layer or curing seal.
- Ensure the contractor uses the specified asphaltic emulsion for the curing seal. Also, obtain the necessary certificates of compliance and samples.
- Ensure the contractor meets the time and temperature requirements for the curing seal. Order any necessary repairs to the damaged curing seal.
- Decide the curing seal's application rate, and advise the contractor accordingly. Base the decision on an amount that will provide a complete membrane without appreciable thickness. To ensure the correct application rate, also check the curing seal's spread rate. Record measured spread rates in the daily report.

4-2404 Measurement and Payment

To determine the pay quantity for lime stabilization, make area measurements of the planned surface.

At the point of delivery, collect weight slips for the lime. Deduct the weight of any wasted or unused lime from the pay quantity for lime. If the contractor has added additional lime to compensate for a lower degree of compaction (as provided for in the specifications), make the required adjustment to the scale weights of the lime.

Measure the quantity of curing seal in accordance with Section 94, "Asphaltic Emulsion," of the *Standard Specifications*.

4-2404 Measurement and Payment

Section 25 Aggregate Subbases

Section 25 Aggregate Subbases

4-2501 General

4-2501 General

Aggregate subbase is designated by class. The *Standard Specifications* describe the requirements for each class, and the contract will specify the class of aggregate subbase to be used.

Aggregate subbase is normally the lowest layer in the structural section, as the contract plans show in their typical cross sections. The typical cross sections also show the thickness of aggregate subbase. The plan layout sheets will show where aggregate subbase is to be placed.

Aggregate subbase may be measured by volume or by mass. The engineer's estimate will show the unit of measurement for aggregate subbase.

4-2502 Before Work Begins

4-2502 Before Work Begins

Before placement begins, review the contract plans and specifications to determine the requirements for aggregate subbase. For the requirements for sampling and testing aggregate base, including frequency of testing, see Chapter 6, "Sampling and Testing," of the *Construction Manual* (manual).

The engineer should also include in the preliminary review and inspections the following steps:

- Verify the Design R-value by testing the basement material at the grading plane to ensure adequate thickness of the structural section. Testing should be completed early enough before the placement of aggregate subbase to allow time for redesign if necessary. (See Topic 604 in the *Highway Design Manual* for a discussion of R-Value and structural section design.) Any necessary adjustments in thickness are usually made in the subbase.
- Test potential sources of aggregate subbase when the contractor requests such testing in writing. When Section 6-2.01, "General," of the *Standard Specifications* requires charging the contractor for initial samples and tests, deduct any applicable charges from contract payments.
- If reclaimed material is being used for the aggregate subbase, ensure the percentage of reclaimed material complies with contract requirements.
- Review compaction tests of the basement material at the grading plane that is to receive aggregate subbase. Ensure the basement material is still firm and stable. Give special attention to isolated areas where pumping occurs.
- Measure the grading plane for compliance with Section 19-1.03, "Grade Tolerance," of the *Standard Specifications*. When measuring for compliance, spot-check areas between stations where stakes are set, as well as the staked locations. District personnel will determine the extent of this measurement, based on various factors such as the nature of material, the efficiency of the contractor's

operation, and the accuracy of the grading operation (as indicated during the early stages of checking). Section 19-1.03 specifies tolerances above or below the grade established by the engineer. This grade will be one resulting from the control stakes placed by Caltrans forces.

- If the contractor proposes to change the method of measurement from mass to volume, in accordance with Section 25-1.03, "Subgrade," of the *Standard Specifications*, to eliminate subgrade preparation, do the following:

  1. Test the material immediately below the grading plane to determine whether it meets all the specifications for aggregate subbase. District personnel will determine the number of such tests depending on the uniformity of the material. The contractor may choose to just leave the subgrade low and fill the low area with the imported aggregate subbase. Ensure the contractor complies with Section 19-5.03, "Relative Compaction (95 Percent)," and Section 25-1.05, "Compacting," of the *Standard Specifications*.
  2. Ensure no material projects above the grade established by the engineer.
  3. For payment, prepare a contract change order (requested by the contractor) establishing a factor to convert volume to mass. Obtain the contractor's agreement before proceeding.

- Give the contractor written permission if you decide that, to stabilize a cohesionless subgrade, the aggregate subbase may be dumped in piles and spread ahead.

- Determine whether the contractor has complied with all requirements related to the use of local materials. (See Section 6-2, "Local Materials," of the *Standard Specifications* for details.)

4-2503 During the Course of Work

4-2503 During the Course of Work

During work operations, the engineer should do the following:

- Sample the aggregate subbase at the time it is deposited on the roadbed. For all requirements related to quality, perform the tests at the frequencies shown in Section 6-1, "Sampling Types and Frequencies," of this manual. The frequency table does have a provision for waiving the testing for R-value, but exercise judgement when doing so. Previous tests must be current. For small amounts (under 500 tonnes), data from other projects or information from your district's laboratory is normally sufficient. On larger projects, consider using at least one potential source or acceptance test as well as past experience on which to base your decision. Include in the project records an explanation of why you waived R-value testing.

- The contractor is not allowed to process material on the roadbed to make it comply with grading specifications. Therefore, before aggregate subbase is deposited on the roadbed, ensure the removal of oversized material and also do any necessary blending.

- Compare sand equivalent and grading test results with requirements for operating range and contract compliance. (See Section 3-608A, "Operating Range and Contract Compliance," of this manual.) Note that the volume of aggregate subbase that may be represented by one test for contract compliance is much less than

that required for testing frequency. It is prudent to take frequent samples, especially with borderline test results, but only test on the frequency shown in the table in Section 6-1 of this manual. If a test result fails to meet the requirement for contract compliance, you may test additional samples, previously taken, to determine the quantity of material represented by the failing test result.

- When aggregate subbase is to be paid for by the tonne, take sufficient moisture samples at the time of weighing to accurately determine pay quantities.
- Ensure aggregate subbase is being spread on the subgrade without significant segregation. Normally, you would perform this step through observation, but if problems persist, support your observations with a sieve analysis. If segregation is taking place, sometimes it can be avoided by wetting the material before it is hauled to the job or before spreading operations start. Watering and compacting go hand in hand. It is important that the proper amount of water is evenly distributed in the aggregate at the time of compaction.
- Observe the spreading and compacting operation to ensure it conforms to the layer thickness requirements of the specifications. Note in the daily report any wasting of material.
- If payment is by the tonne, measure waste, and deduct such quantities. Advise the contractor immediately when you are considering such deductions. However, some material may be lost during any trimming, and district personnel will decide when such trimmings should be measured. In general, measure trimmings when the cost of such measurement does not exceed the anticipated deduction.
- Test the compaction of aggregate subbase layers. The testing frequencies shown in Section 6-1 of this manual indicate testing will be "as necessary for acceptance." The decision on how much testing is necessary will be based on the material's uniformity and the particular operation. Generally, if the operation is uniform and well within specifications, you may decrease testing frequencies. For nonuniform operations with borderline results, increase testing frequency.
- For Class 1, 2, and 3 aggregate subbase, observe the compacting operation to ensure the material forms a firm, stable base.
- Measure the surface of the finished aggregate subbase for conformance with tolerances specified in Section 25-1.05, "Compacting," of the *Standard Specifications*. Control stakes set by state forces determine the planned elevation of the subbase surface. Require corrective action for any deficiencies.
- Measure the thickness of the completed aggregate subbase. Use your judgement to determine the number of measurements necessary. The minimum acceptable thickness of aggregate subbase equals the planned thickness less the specified tolerances for high basement material and low surface of aggregate subbase. A thin section is acceptable if the deficiency is made up by additional thickness in a base material above the aggregate subbase. The *Standard Specifications* allow the engineer to accept a deduction for deficient thickness in lieu of other corrective action. However, Caltrans policy is to ensure thickness complies with requirements by ordering corrective action if thickness is deficient. Therefore, in only the most extenuating circumstances should you apply the deduction.
- Keep adequate records for payments on progress pay estimates and on final estimates. The type and frequency of measurement will depend on the measurement and payment clauses of the contract.

- Note in the daily report any inspections performed on items that are not otherwise part of a permanent record. For instance, you do not need to note any compaction tests taken because these are recorded elsewhere. However, you do need to explain in the daily report any absence of testing. You also need to note that construction is being performed in accordance with specified layer thicknesses because this information is not recorded elsewhere.

4-2504 Measurement and Payment

4-2504 Measurement and Payment

When aggregate subbase is paid for by the tonne, see the discussion of weighing and measuring procedures in Section 3-9, “Measurement and Payment,” of this manual.

When aggregate subbase is to be measured and paid for by the cubic meter, begin making quantity calculations as early in the project as possible. Obtain quantity calculations from Project Development to determine if they are sufficiently detailed and accurate to be used in the project records.

Section 26 Aggregate Bases

Section 26
Aggregate Bases

4-2601 General

4-2601
General

The contract will define the class of aggregate base to be used, the dimensions to which it is to be placed, and the specific unit of measurement. For the requirements for sampling and testing aggregate base, including frequency of testing, see Chapter 6, "Sampling and Testing," of the *Construction Manual* (manual).

4-2602 Before Work Begins

4-2602
Before Work Begins

Before work begins, review the contract plans and specifications to determine the requirements for aggregate base

The engineer should also include in the preliminary review and inspections the following steps:

- If the contractor is to place the aggregate base on original ground, verify the Design R-value by testing the basement material at the grading plane to ensure adequate thickness of the structural section. Testing should be completed early enough before the placement of the aggregate base to allow time for redesign if necessary. (See Topic 604 in the *Highway Design Manual* for a discussion of R-Value and structural section design.) Any necessary adjustments in thickness are usually made in the aggregate base.
- Test potential sources of aggregate base when the contractor requests such testing in writing. When Section 6-2.01, "General," of the *Standard Specifications* requires charging the contractor for initial samples and tests, deduct any applicable charges from contract payments.
- If reclaimed material is being used for the aggregate base, ensure the percentage of reclaimed material complies with contract requirements.
- Review compaction tests of the subgrade that is to receive aggregate base. Examine the subgrade to ensure that it has not deteriorated since it was tested. Ensure that the material underlying the grading plane is still firm and stable. Special attention is required in isolated areas where pumping occurs.
- For specification compliance, measure the subgrade of the aggregate base. When measuring for compliance, spot-check areas between stations where stakes are set as well as at the staked locations. District personnel will determine the extent of this measurement, based on various factors such as the nature of the material, the efficiency of the contractor's operation, and the accuracy of the grading operation (as indicated during the early stages of checking). For subgrade, the specifications specify tolerances above or below the grade established by the engineer. This will be the grade resulting from the control stakes placed by Caltrans forces.
- Give the contractor written permission if you decide that, to stabilize a cohesionless sand subgrade, the aggregate base may be dumped in piles and spread ahead.

- Determine whether the contractor has complied with all requirements related to the use of local materials. (See Section 6-2, “Local Materials,” of the *Standard Specifications* for details.)

4-2603 During the Course of Work

4-2603 During the Course of Work

During work operations, the engineer should do the following:

- Sample the aggregate base at the time it is deposited on the roadbed. For all requirements related to quality, perform the tests at the frequencies shown in Section 6-1, “Sampling Types and Frequencies,” of this manual. The frequency table does have a provision for waiving the testing for R-value, but exercise judgement when doing so. Previous tests must be current. For small amounts (under 500 tonnes), data from other projects or information from your district’s laboratory is normally sufficient. On larger projects, consider using at least one potential source or acceptance test as well as past experience on which to base your decision. Include in the project records an explanation of why you waived R-value testing.
- The contractor is not allowed to process material on the roadbed to make it comply with grading specifications. Therefore, before the aggregate base is deposited on the roadbed, the contractor must remove any oversized material and do any necessary blending.
- Compare sand equivalent and grading test results with requirements for operating range and contract compliance. See Section 3-608A, “Operating Range and Contract Compliance,” of this manual. Note that the volume of aggregate base that may be represented by one test for contract compliance is much less than that required for testing frequency. It is prudent to take frequent samples, especially with borderline test results, but only test on the frequency shown in the table in Section 6-1 of this manual. If a test result fails to meet the requirement for contract compliance, you may test additional samples, previously taken, to determine the quantity of material represented by the failing test result.
- When aggregate base is to be paid for by the tonne, take sufficient moisture samples at the time of weighing to accurately determine pay quantities.
- Observe the spreading operation to ensure it complies with the requirements. Note in the daily report any wasting of material. Ensure aggregate base is being spread without significant segregation. Normally, you would perform this step through observation, but if problems persist, support your observations with a sieve analysis.
- If payment is by the tonne, measure waste and deduct such quantities. However, some material may be lost during any trimming, and district personnel will decide when such trimmings should be measured. In general, measure trimmings when the cost of such measurement does not exceed the anticipated deduction.
- Test the compaction of aggregate base layers. The testing frequencies shown in Section 6-1 of this manual indicate testing will be as necessary for control. District personnel will decide how much testing is necessary, based on the material’s uniformity and the particular operation. Generally, if the operation is uniform and well within specifications, you may decrease testing frequency. For nonuniform operations with borderline results, increase testing frequency.
- Observe the compacting operation to ensure the material forms a firm, stable base.

- Measure the surface of the finished aggregate base for conformance with tolerances specified in Section 26-1.05, “Compacting,” of the *Standard Specifications*. Control stakes set by Caltrans forces determine the planned elevation of the aggregate base surface. Require corrective action for any deficiencies. Measure the thickness of the completed aggregate base. Use your judgement to determine the number of measurements necessary. The minimum acceptable thickness equals the planned thickness less the sum of the specified high tolerance on the aggregate base subgrade and low tolerance for the surface of aggregate base.
- The *Standard Specifications* allow the engineer to accept a deduction for deficient thickness in lieu of other corrective action. However, Caltrans policy is to ensure thickness complies with requirements by ordering corrective action if thickness is deficient. Therefore, in only the most extenuating circumstances should you apply the deduction. Keep adequate records for payments on progress payment estimates and on final estimates. The type and frequency of measurement for your records will depend on measurement and payment clauses of the contract.
- Note in the daily report any inspections performed on items that are not otherwise part of a permanent record. For instance, you do not need to note any compaction tests taken because these are recorded elsewhere. However, you do need to explain in the daily report any absence of testing. You also need to note that construction is being performed in accordance with specified layer thickness because this information is not recorded elsewhere.

4-2604 Measurement and Payment

4-2604 Measurement and Payment

When aggregate base is paid for by the tonne, see the discussion of weighing and metering procedures in Section 3-9, “Measurement and Payment,” of this manual.

When aggregate base is to be paid for by the cubic meter, begin making quantity calculations as early in the project as possible. Obtain quantity calculations from Project Development to determine if they are sufficiently detailed and accurate to be used in the project records.

Section 27 Cement Treated Base

4-2701 General

4-2702 Before Work Begins

4-2703 During the Course of Work

4-2703A Road-Mixed CTB
4-2703B Plant-Mixed CTB
4-2703C Depositing and Spreading CTB
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4-2704 Measurement and Payment

Section 27 Cement Treated Bases

Section 27 Cement Treated Bases

4-2701 General

4-2701 General

Cement-treated base (CTB) is composed of a mix of aggregate, portland cement, and water. CTB, specified as either Class A or Class B, is generally used only with asphalt pavements and can be either plant mixed or road mixed. However, plant mixed is most common.

CTB can be spread by three allowable methods. The special provisions will specify the class, mix method, and possibly the spreading method.

4-2702 Before Work Begins

4-2702 Before Work Begins

Before work begins, take the following steps:

- Hold a preproduction meeting with the contractor and the district materials unit to discuss the contractor's method of operations.
- From the special provisions or plans, determine the class of CTB required and the percent of cement to be added to the aggregate.
- For initial testing, obtain representative samples from the contractor's source of CTB aggregate, and test for the required quality. Compressive strengths of CTB can vary significantly because of variations in aggregate gradation and the type of cement used. The fine aggregate usually has the most variable effect on strength. Advise the contractor that any significant material change, including variations in gradation, must be covered by new tests for quality characteristics. Request strength tests at 5 percent of cement and other percentages above and below 5 percent (usually in 0.5 percent increments). For aggregates of borderline quality, consider making additional initial strength tests at varying gradations (within specifications), using 5 percent cement.
- For sources with reliable information on past performance, consider using such information in lieu of testing. However, a test should always be made at 5 percent for aggregate qualification.
- Based on test results, decide whether the percent of cement specified in the special provisions will produce the design strength in the finished product. When making the decision, consider that, because of production variables, a significant difference can exist between the strength indicated by a cylinder and the actual strength of the finished product. Allowable variations in cement content and compaction requirements are major contributors to differences between design and actual strength. If it is difficult to determine the effect of production variables on final strength, use the following guidelines:

  1. Increase cement content if the seven-day compressive strength of initial samples is less than approximately 6.9 Mpa.
  2. Decrease cement content if the seven-day compressive strength of initial samples at the percent specified is more than approximately 8.6 Mpa.

- Verify that safe and convenient facilities have been provided for sampling cement.
- Verify that the aggregate source complies with the Surface Mining and Reclamation Act of 1975. Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. You can obtain this list from the Division of Construction or the Department of Conservation's web site at http://www.consrv.ca.gov/omr/SMARA/3098-list.
- If the contractor will be batch mixing, examine the mixer before use and call to the contractor's attention any excessively worn or missing paddles.
- Before spreading any CTB materials, ensure that the subgrade complies with specifications and that the grade is free of loose or extraneous material. Record the findings in the daily report, including any instructions to the contractor.
- Determine that the asphaltic emulsion used for curing seal is the material specified, and obtain necessary certificates of compliance and samples.
- Decide on the application rate for the curing seal to be used, and advise the contractor accordingly. Base the determination on an amount that will provide a complete membrane without appreciable thickness. Ensure the application rate conforms to requirements.

4-2703 During the Course of Work

4-2703 During the Course of Work

During the work, do the following:

- Before mixing, obtain samples of the aggregate and test them for the specified attributes in accordance with the frequencies shown in Section 6-1, "Sample Types and Frequencies," of the *Construction Manual* (manual).
- To evaluate the compressive strength of Class A CTB, obtain samples during the first day of operation and approximately every fifth day of production thereafter. If these tests reasonably match the anticipated results based on the initial tests, you can reduce the frequency of the tests (unless a change in material is suspected or the material sources were changed).
- To determine compliance with permissible variations in cement content, obtain sufficient samples for California Test 338, "Determination of Cement or Lime Content in Treated Aggregate by the Titration Method." Section 6-1, "Sample Types and Frequencies," of this manual states the frequency should be "as necessary for control." This frequency may vary depending on the efficiency of the contractor's operation and rate of production. At a minimum, assign one inspector full time to run the titration tests while the operation is in full-time production. At the start of operations or when problems persist, more effort may be required.
- Determine whether compaction requirements are being met. It is Caltrans' policy to measure compaction separately for each lift whenever this separate measurement is physically possible.

4-2703A Road-Mixed CTB

For road-mixed CTB used during the course of work, do the following:

- If you think the quantity being placed obviously is not sufficient to complete the required structural section thickness, advise the contractor. Record any conversation in your daily report.

- Ensure the mixer introduces water by approved methods. To keep the resulting mixture uniformly moist, the mixer should be able to accurately vary the water rate. Advise the contractor to correct leaks or excessive water applications.
- Observe the mixing operation to ensure the uniform distribution of cement and water. When the mixer has a bottom shell or pan to pick up the material and separate it from the mixing table, ensure the shell or pan picks up all the material and doesn't cut into the subgrade.
- Ensure the cement is spread by mechanical equipment that can be calibrated to uniformly distribute the cement in the correct amount. Placing cement by hand methods, such as by sacks, is unacceptable.
- Take sufficient moisture tests to ensure the completed mixture's moisture content does not fall below one percentage point from optimum.
- For multilayer construction, ensure the contractor mixes and compacts each layer separately.

4-2703B Plant-Mixed CTB

For plant-mixed CTB used during the work, do the following:

- To calibrate and check the accuracy of weighing and metering devices, request assistance from the district weights and measures coordinator.
- Ensure the contractor is adding water by a method that permits the amount or rate to be verified. Obtain sufficient moisture tests to ensure the completed mixture's moisture content does not fall below one percentage point from optimum.
- To detect any obvious faults, observe the mixing operation and the mixture. Time the mixing operation to ensure it takes longer than 30 seconds. If observations or tests indicate poor cement distribution, require a longer mixing cycle.

4-2703C Depositing and Spreading CTB

During the depositing and spreading of CTB, do the following:

- Ensure the contractor uses the specified type of spreading operation.
- Generally, if loads are hauled in hot weather and if the haul takes more than 30 minutes, require covers on hauling units.
- Spreading can be a separate operation from depositing or it can be combined in a single operation with depositing. If spreading is a separate operation, ensure the contractor complies with the requirements for uniform placement.
- If you think the quantity being placed is insufficient to construct the required structural section thickness, advise the contractor. Record any conversation in the daily report.
- Immediately before placing CTB, ensure the underlying material is moist but not excessively wet.
- Observe whether significant segregation is occurring. If problems persist, perform additional tests to document the problem.
- Observe the surface condition of any lower layer of CTB. Ensure the contractor complies with moisture requirements for lower layers. Keep separate records for any curing seal placed on lower layers.

- Ensure the contractor uses satisfactory methods to place CTB in areas inaccessible to mechanical spreading equipment. The end product must be homogeneous, placed to the required thickness, and properly compacted.
- Ensure the contractor complies with temperature requirements for spreading CTB.

4-2703D Compacting CTB

During the compacting of CTB, do the following:

- Measure the operation's total time interval to ensure it conforms to Section 27-1.08, "Operation Time Requirements," of the *Standard Specifications*.
- To ensure compliance with compaction requirements, test each layer of multilayer construction.
- After the initial rolling, ensure the finished surface is within the specified tolerance. Require the contractor to trim high spots and to meet the requirements for filling low areas. Prohibit the contractor from filling low areas with loose material from the trimming operation.
- Ensure the equipment used for final compaction repairs any surface areas that the trimming has torn or segregated.
- To ensure compliance with the specified tolerance, measure the finished surface with a straightedge.

4-2704 Measurement and Payment

4-2704 Measurement and Payment

For measurement and payment, do the following:

- Use contract change orders to cover ordered changes in the cement content.
- Do not pay as CTB any excess material used at other locations.
- When CTB is paid for by the tonne, refer to the discussion of weighing and metering procedures in Section 3-9, "Measurement and Payment," of this manual. Make any appropriate deductions for excess moisture.
- When CTB is to be paid for by the cubic meter, obtain quantity calculations from the project engineer to determine if they are sufficiently detailed and accurate to be used in the project records. Make appropriate deductions for any lack of compliance with thickness specifications.
- For more information about measuring curing seal, refer to Section 4-94, "Asphaltic Emulsions," of this manual.

Section 28 Lean Concrete Base

Section 28 Lean Concrete Base

4-2801 General

4-2801 General

Lean concrete base is normally used under portland cement concrete pavement and is more rigid and less erodible than cement-treated base. The quality of aggregates for both bases is similar. However, lean concrete base is proportioned, mixed, and placed in a manner similar to portland cement concrete pavement while cement-treated base is not.

The contractor must proportion the aggregate so that it meets the specified grading requirements. The engineer determines the cement content to be used. For design considerations for lean concrete base, see Chapter 600 of the *Highway Design Manual*.

Resident engineers need to plan carefully to fully meet the requirements for inspecting and testing materials. When planning for the inspection of lean concrete base, consider the following:

- The production of lean concrete base
- The placing, finishing, and curing of the base
- The subgrade, specified equipment, and construction of joints for the base

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.

This section focuses on the resident engineer's on-site inspection duties. For information on producing and transporting lean concrete base, see Section 4-90, "Portland Cement Concrete," of the *Construction Manual* (manual).

4-2802 Before Work Begins

4-2802 Before Work Begins

Before work begins, take the following steps:

- For general requirements, review the *Standard Specifications* and plans. For any special requirements, review the special provisions.
- Review the engineer's estimate of quantities to verify accuracy.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists the aggregate, cement, and curing compound for lean concrete base.
- Section 28-1.01, "Description," of the *Standard Specifications*, specifies the cement content for lean concrete base. After testing the contractor's proposed

aggregate supply, the cement content may be increased. To test the proposed aggregates in accordance with Section 28-1.02, "Materials," of the *Standard Specifications*, take the following steps:

1. Obtain in writing the contractor's proposed grading and source of aggregate.
2. Check to ensure the aggregate's source site is permitted and complies with the Surface Mining and Reclamation Act of 1975. Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. You can obtain this list from the Division of Construction or the Department of Conservation's web site at http://www.consrv.ca.gov/omr/SMARA/3098-list.
3. Well in advance of the 45-day requirement for making aggregates available for sampling, contact the Office of Engineering Materials and Testing Services (METS) to determine whether METS is reviewing the cement content for the base. It is the resident engineer's responsibility to ensure this process has begun. The district materials engineer may be a good initial contact.
4. METS may perform the required testing to determine cement content or it may establish the cement content based on previous aggregate testing from the same source.
5. If METS has received Form CEM 3101, "Notice of Materials to Be Used," it will probably have initiated action to determine the cement content. If METS needs aggregate testing samples, the resident engineer will be advised. Either district materials laboratory personnel or project personnel may obtain the samples.
6. METS will notify the resident engineer of the cement content to be used. In accordance with Section 28-1.10, "Payment," of the *Standard Specifications*, if the amount to be used is greater than the specified content, prepare a contract change order to provide an adjustment in compensation.

- Should the contractor change the supply source, repeat the procedure for determining cement content.
- Examine equipment or tools to be used for placement following the steps listed below. When obvious inadequacies exist, advise the contractor and enter the details in the daily report.

1. For sideform construction:
   a. Examine the forms to ensure they have the specified attributes for items such as composition, weight, dimensions, and rigidity. Before each use, ensure the forms are cleaned and oiled.
   b. Ensure the installation of the forms complies with specifications. Before the placement of concrete, order any necessary corrective work.
   c. Ensure the paving equipment complies with specifications.

2. For slipform construction, ensure the paver has the specified attributes. Require the specified demonstration of satisfactory operation and note such activity in the daily report.

3. To ensure the contractor meets the requirements for protecting the base, examine all equipment that will travel on the completed base.

- Just before the start of paving check the accuracy of the final grade stakes.
- Inspect the subgrade to ensure it conforms to the tolerances specified for compaction and elevations. Ensure that any low areas are identified and will be filled with additional base and that any high areas are trimmed as specified. Additional thickness is paid for as part of the lower layer and must not be included when calculating base thickness.
- When slipform pavers are used, inspect the grade upon which the paver will ride to determine if it is smooth enough to prevent abrupt vertical changes in the finished surface. When the paver controls the grade and alignment by a wire, sight along the wire for any obvious variations, and order necessary corrections. Ensure the wire is tensioned sufficiently so no measurable sag occurs between the supporting stakes. Advise the contractor if you anticipate any problems. Keep in mind that the contractor is responsible for compliance with thickness and grade requirements.
- Check the facilities proposed for producing and transporting lean concrete base. Section 4-90, "Portland Cement Concrete," of this manual covers the items involved.
- Ascertain the curing methods and type of material the contractor proposes to use. Discuss with the contractor the requirements for labeling and packaging the curing compound.
- The material specified for curing depends on whether the overlying surface will be portland cement concrete pavement or asphalt concrete pavement. When the overlying surface is portland cement concrete, the specifications require a much higher percentage of paraffin wax in the curing compound than that required for an overlying surface of asphalt concrete.
- The curing compound for an overlying surface of portland cement concrete serves a dual purpose. It both cures the lean concrete base and also, after the pavement is placed, provides a bond-breaking membrane between the pavement and base. The bond breaker is very important if cracks and the longitudinal weakened plane joint in the lean concrete base are to be prevented from reflecting through the pavement.
- Examine the equipment to be used for applying the curing compound to determine whether it meets specifications.
- Before paving begins, ensure equipment for constructing longitudinal weakened plane joints is onsite and conforms to specifications.
- Confirm placement dates with the contractor and arrange Caltrans personnel for plant inspection and testing.
- If paving or finishing operations will extend beyond daylight hours, ensure the project has adequate lighting before the contractor begins placing the lean concrete base.

- When the project requires long hauls, review the contractor's proposed placement method to ensure adequate time.
- Before placing the lean concrete base, ensure the subgrade is uniformly moist.

4-2803 During the Course of Work

Once work begins, take the following steps:

- Before mixing, obtain samples of the aggregate. Also, in accordance with the frequency shown in Section 6-1, "Sample Types and Frequencies," of this manual, test for the specified attributes. Initially, and in the case of borderline material, take and save additional samples. In case the first samples tested do not meet the requirements for contract acceptance, the extra samples may be tested to determine the extent of the failing material.
- When the results of grading or sand equivalent tests, or both, are outside the limits for contract compliance, determine whether the lean concrete base represented by the tests is structurally adequate. When lean concrete base is left in place even though it does not comply with the contract, the specified payment by the contractor must be made by administrative deduction. Document the reasons for leaving the concrete in place, and notify the contractor of your decision and the deduction amount.
- For placing lean concrete base and applying curing compound, ensure the subgrade is not frozen and the ambient temperature is above the minimums required.
- As it is placed, observe the lean concrete base for any improper proportions or inadequate mixing. In the daily report, record the reasons for rejecting any lean concrete base and the approximate amount rejected.
- Ensure the contractor furnishes the required tachometer. Also, check to ensure that frequencies are as specified. Immediately replace inoperative vibrators.
- To ensure the correction of any problems related to mixing or hauling, maintain good communication with the engineers who inspect operations at the mixing plant. For more detailed information about transporting concrete and receiving load tickets at the delivery point, see Section 4-90, "Portland Cement Concrete," of this manual.
- Obtain samples of the plastic concrete, and perform penetration and air content tests in accordance with the frequencies shown in Section 6-1 of this manual.
- Compressive strength tests of the lean concrete base are only necessary to confirm design assumptions. For information, it is recommended that you test compressive strength near the start of placing lean concrete base.
- Ensure the material for longitudinal weakened plane joints is placed to the dimensions specified. Also, ensure the contractor vibrates the lean concrete base to cause an even flow of material about the joint.
- Ensure the construction of a contact joint whenever an interval exists that is greater than the specifications allow between the placement of any two successive loads of lean concrete base.
- When the contractor uses side form construction, ensure screeding and tamping conforms to the specifications. Where the hand-float method is permissible, ensure the contractor uses the specified floats and methods.

- Ensure the surface of the lean concrete base is textured as specified. Lean concrete base to be surfaced with asphalt concrete must have a rough texture to prevent slippage between surfacing and base. Lean concrete base to be surfaced with portland cement concrete pavement must have a smooth texture to allow the pavement to adjust for early thermal and moisture changes without forming random cracks.
- Ensure the contractor uses the proper material for curing the lean concrete base.
- Ensure shipments of curing compound are labeled and packaged as specified. If the compound is shipped in tanks or tank trucks, obtain a copy of the shipping invoice, and verify the invoice contains the specified information. Determine if the supplied material is on the approved list of curing compounds. (For a list of approved compounds, see the district materials engineer or the responsible unit.) Prohibit the use of an improperly identified curing compound until it has been sampled and tested. For details about these procedures, see Section 6-2, "Acceptance of Material and Sampling Methods," of this manual.
- As required under Section 6-1, "Sample Types and Frequencies," of this manual, obtain samples of the curing compound for acceptance tests.
- Ensure the curing compound is properly agitated before and during application to achieve complete mixing. Also, observe that the compound is applied as a uniform membrane at the specified time. Ensure any disturbed areas receive additional curing compound.
- Ensure that the curing compound is not contaminated, diluted, or altered in any way before application, that it is applied when surfaces are still visibly moist, and that the compound film remains unbroken during the specified curing period.
- To determine the curing seal's application rate, perform both measurements and calculations. You may also use California Test 535, "Determining the Application," to determine the application rate. Record such measurements in the daily report.
- After the curing seal has been applied, decide whether it is necessary to fog the lean concrete base as described in Section 90-7.02, "Curing Pavement," of the *Standard Specifications*.
- When specified, require additional applications of curing compound.
- Measure the finished surface of the lean concrete base. Record the measurements, and require the specified corrections for areas not meeting elevation requirements. Ensure high areas are addressed immediately. For high areas that have been ground, ensure the curing compound is reapplied as specified.
- Enforce the requirements in Section 7-1.02, "Load Limitations," of the *Standard Specifications*, which covers the use of the completed lean concrete base by traffic or the contractor's equipment.

4-2804 Measurement and Payment

4-2804 Measurement and Payment

Using the dimensions shown on the plans, calculate the quantity of lean concrete base for which payment must be made. In these calculations, account for curves in alignment by using curve corrections.

Section 4-29 Treated Permeable Bases

4-2901 General

4-2902 Before Work Begins

4-2903 During the Course of Work

4-2903A Asphalt-Treated Permeable Base
4-2903B Cement-Treated Permeable Base
4-2903C Protection
4-2903D Surface Tolerance

4-2904 Measurement and Payment

Section 29 Treated Permeable Bases

Section 29 Treated Permeable Bases

4-2901 General

4-2901 General

Treated permeable base, used under portland cement concrete pavement and under asphalt concrete pavement, provides a highly permeable drainage layer within the structural section. It also provides part of the strength of the base layer.

The special provisions specify the type of treatment, either asphalt or cement. Many of the requirements for producing and placing treated permeable bases are also those specified for asphalt concrete, portland cement concrete, and portland cement concrete pavement.

4-2902 Before Work Begins

4-2902 Before Work Begins

During this preliminary inspection, take the following steps:

- Review the contract plans and specifications to determine the requirements for the treated permeable base.
- Obtain samples of aggregates to test for contract compliance. If the same source is used to produce aggregate for other Caltrans work, decide whether current test reports represent the material to be used. If so, initial sampling and testing can be waived.
- Examine the contractor's plant and storage areas to determine contract compliance. Section 4-39 "Asphalt Concrete" and Section 4-90 "Portland Cement Concrete," of the *Construction Manual* (manual) provide guidelines.
- Review compaction tests of the subgrade that is to receive treated permeable base. Determine if the material underlying the grading plane meets compaction requirements. Also ensure that the grading plane is firm and stable. Pay special attention in isolated areas where pumping occurs. Determine that the subgrade is free of loose or extraneous material and that the subgrade is not higher than the grade established by the engineer, plus tolerance. Spot-check areas both between stations where stakes are set as well as at staked locations.
- Verify that filter fabric meets specifications.
- Review planned locations of cross-drain interceptors. (Refer to Sheet D99D of the *Standard Plans*.) Ensure the interceptors are properly located to prevent impounding water under the pavement. Inspect the placement of filter fabric. See Section 4-68, "Subsurface Drains," of this manual for information about underdrains.
- Examine spreading and compacting equipment to determine contract compliance.
- Determine that the atmospheric temperature meets the specified minimum before spreading begins.
- Determine that the subgrade is uniformly moist before spreading cement treated permeable material (CTPB).

4-2903 During the Course of Work

During the work, follow the inspection steps listed within each of the four areas below:

4-2903A Asphalt-Treated Permeable Base

- Determine which compaction method the contractor plans to use.
- Check the temperature of the asphalt-treated permeable base (ATPB) to ensure that compaction is performed within the specified temperature range.
- Take samples of the completed mix from trucks at the plant or from the mat behind the paver.
- Verify that filter fabric is placed on the high side of the ATPB blanket in accordance with the plans and specifications.
- During placement of the ATPB over edge drains, verify that the temperature of the material falls within the limits specified in Section 68-3.03, "Installation," of the *Standard Specifications*, which covers the installation of subsurface drains. Staying below the maximum limit is critical to prevent damage to the edge drains.

4-2903B Cement-Treated Permeable Base

- Verify that the contractor meets the time and temperature requirements for mixing and transporting.
- Reject any segregated or nonuniformly mixed CTPB.
- Observe rolling to determine that compaction meets specifications.
- Determine that the base is cured as specified.
- Verify that filter fabric is placed on the high side of the CTPB blanket in accordance with the plans and specifications.
- During placement, ensure the cement does not plug the openings in the edge drains.

4-2903C Protection

Contamination, filling voids with foreign material, will destroy the bases' function. The engineer should be alert to this problem and require the contractor to take steps to ensure the base remains free of any foreign material.

Do not allow any equipment on the completed mat except what is permitted in Section 7-1.02, "Load Limitations," of the *Standard Specifications*.

4-2903D Surface Tolerance

For the finished surface of treated bases, the specifications provide for tolerances above and below the grade established by the engineer. Check the finished surface as described for subgrade under "Before Work Begins" in this section. Record the results, and require the specified corrections for low or high areas. You may have to decide whether to order removal and replacement of or to permit low-treated permeable base to remain in place. Formulas using infiltration rates found in Topic 606 of the *Highway Design Manual* may be used to determine the adequate thickness of treated permeable base layers. If low-treated permeable base is left in place, ensure the contractor compensates for the deficiency in the thickness of the overlying pavement.

4-2904 Measurement and Payment

4-2904
Measurement and
Payment

Calculate the quantities for treated permeable bases from the dimensions shown on the plans adjusted by the amount of any changes. The volume of treated permeable base placed for edge drains and cross-drain interceptors is included in the payment for edge drains.

Section 37 Bituminous Seals

4-3701 General

4-3702 Seal Coats

4-3702A Before Work Begins
4-3702B During the Course of Work
4-3702C Measurement and Payment

4-3703 Slurry Seal

4-3703A Before Work Begins
4-3703B During the Course of Work
4-3703C Measurement and Payment

Section 37 Bituminous Seals

Section 37
Bituminous Seals

4-3701 General

4-3701
General

Section 37, "Bituminous Seals," of the *Standard Specifications* covers seal coats and slurry seals.

Seal coats are either fog seals, an application of asphaltic emulsion with added water, or asphaltic emulsion and screenings (commonly known as "chip seals").

Slurry seal is a mixture of graded fine aggregate, asphaltic emulsion, water, and set-control additives.

In addition to the bituminous seals provided for in the *Standard Specifications*, the special provisions may provide for hot-applied seal coat (polymer-modified asphalt), asphalt-rubber seal coat, parking lot seal coat, or asphalt rejuvenating agent. This section will discuss the duties of resident engineers and assistant resident engineers regarding seal coats and slurry seals.

For the most part, bituminous seals are used to maintain existing asphalt concrete pavement. Bituminous seals on new work are generally limited to fog seal on asphalt concrete dikes, miscellaneous areas, and shoulders.

4-3702 Seal Coats

4-3702
Seal Coats

The following covers the duties required throughout each phase of the project for seal coats.

4-3702A Before Work Begins

Before work begins, take the following steps:

- Review the contract to determine the type of bituminous seal required. Note the particular type of bituminous binder to be used, the requirements for aggregates, and any special details. Special details may include local agency requirements with regard to air quality and other environmental restrictions. Decide whether any conditions have changed from those upon which the design engineer based the requirements, and make any necessary changes.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists seal coat materials.
- Ensure the aggregate comes from a permitted source site that complies with the Surface Mining and Reclamation Act of 1975. Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. You can obtain this list from the Division of Construction or the Department of Conservation's web site at http://www.consrv.ca.gov/omr/SMARA/3098-list.
- Obtain initial samples of screenings, and test them for all of the specified attributes. Advise the contractor of the test results, with particular reference to any deficiencies that must be corrected.

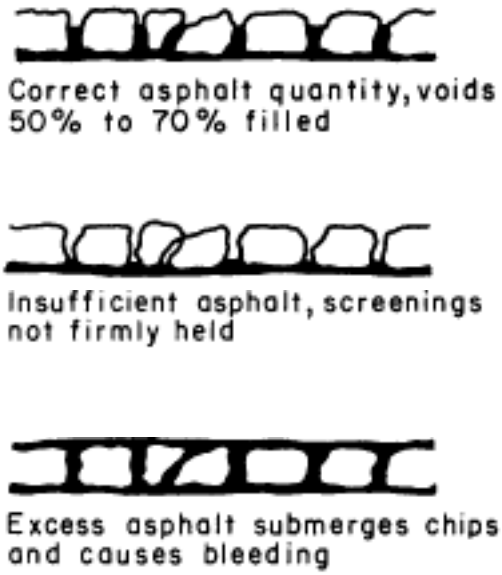
- Examine the surface to be sealed. Prepare a contract change order to provide for any necessary corrective action, such as sealing cracks and repairing failed areas. At this stage, a joint review with the maintenance region manager or area superintendent would be helpful.
- Review the project to ascertain all requirements for handling traffic. Review with the contractor the required traffic control system and traffic control devices.
- Decide on and advise the contractor of the exact application rates of screenings and bituminous binder that will be used.
- For fog seal, decide on the water amount to be added to asphaltic emulsion. The quantity to be added must be based on the judgement and experience of field personnel. Take into account the permeability of the surface to be sealed, climatic conditions anticipated at the time of application, traffic, and desired spread rate. Unless circumstances dictate less, use the maximum amount permitted. This approach makes it easier to obtain a correct and uniform spread, especially when lighter spread rates are used.
- Determine temperatures, and ensure that bituminous seals are not placed when the applicable atmospheric or pavement temperatures are below the minimums specified.
- Be prepared to receive the latest weather reports, and have a means established for making contact with the contractor's authorized representative before 4:00 p.m. on the day before the intended workday. Note that the specification for notification of anticipated unsuitable weather conditions applies to both fog seals and chip seals. Prepare a contract change order, if it becomes necessary, to pay for standby time.
- Determine whether the surface to be sealed is clean and dry. Ensure the contractor cleans the surface to remove all loose particles of pavement, dirt, and other extraneous material.
- Examine distributor trucks, chip spreaders, rollers, and other equipment to ensure that specifications are met.

4-3702B During the Course of Work

Once work begins, take the following steps:

- Obtain the required test report for each truckload of asphaltic emulsion. Compare the report with the specifications. Do not permit the emulsion to be used before testing unless a Certificate of Compliance accompanies it.
- Obtain samples of the asphaltic emulsion in accordance with the frequency tables in Section 6-1, "Sample Types and Frequencies," of the *Construction Manual* (manual). For emulsion used in fog seals, it is preferable to take samples of the emulsion before adding water. If this approach is impractical, note on the sample form the amount of added water (that is, how many parts of water to how many parts of emulsion).
- From the delivered material, obtain samples and test them for sieve analysis and cleanness value in accordance with the frequency tables in Section 6-1 of this manual.

- Just before spreading, determine the temperature of the liquid asphalt or emulsion to ensure it falls within the specified range. Note such temperatures in the daily report and also, if volumetric measurements are to be used to determine pay quantities, on source documents.
- Obtain the weight slip for each load of liquid asphalt or emulsion. If the load has been hauled a long distance and job scales are available, it is good practice to weigh the load in using the job scales and, after spreading, to weigh the load out on these same scales.
- Unless the screenings are at the work site and ready to be applied, prohibit the contractor from spreading the emulsion.
- To check the spread rate for asphaltic emulsion, measure the volume in the distributor truck tank before and after spreading the asphaltic emulsion for the first few hundred meters. Then, calculate the rate for that distance. Calculate and record the overall daily spread rate in the daily report.
- Through observation, ensure the application of asphaltic emulsion is uniform, both transversely and longitudinally. If the spread does not appear to be uniform, order the correction of spreading equipment. If problems persist, perform the California Test 339, "Field Test for the Determination of Distributor Spread Rate" and before allowing the operation to continue, require corrective action.
- Require the contractor to keep the distributor truck close to the chip spreader. Good practice is to place screenings within 30 seconds after the bituminous binder has been spread. Screenings must be placed before setting or "breaking" of the asphaltic emulsion occurs. This setting or breaking is indicated by a change in color from brown to black.
- Determine whether screenings are damp at the time of application, as required in the specifications, and when necessary, order wetting.
- Observe the coat of screenings behind the chip spreader. If necessary, order an adjustment in the screening spread rate. The figure below shows the desirable relationship between the quantity of asphalt required to the size of the cover material.



- If the chip spreader is moving excessively fast, chips will roll over as they come in contact with the emulsion. As a result, public traffic and roller tires will pick up the chips. If chips are being turned over, check behind the spreader and order a reduced speed.
- Ensure the contractor performs the rolling in the specified order and for the required number of coverages. Also, ensure the contractor does not spread the binder and screenings more than 760 m ahead of the completion of the initial rolling.
- Adjust the spread rate of screenings to prevent pickup by rollers or traffic. However, prohibit a higher spread rate than necessary. Excessive screenings will increase cost and the difficulty of cleanup operations.
- Ensure the contractor discontinues spreading bituminous binder sufficiently early in the shift to permit the termination of traffic control before darkness.
- Decide on the amount of water to be sprinkled on a fog seal that becomes tacky, and advise the contractor accordingly.
- Ensure the contractor performs brooming as specified. Before allowing uncontrolled traffic in adjacent lanes, ensure the removal of all loose chips. The most common cause of damage by loose chips results from vehicles in an adjacent lane throwing the chips. During brooming, ensure lanes adjacent to chip-sealed lanes remain free of loose screenings. During maintenance, order the seal coat to be swept as often as necessary to keep the surface free of loose screenings.
- Decide whether excess screenings should be salvaged and stockpiled or otherwise disposed of, and advise the contractor of the decision. Unless they are economically useful, screenings should not be salvaged.
- Observe the completed application of screenings and order immediate application of additional screenings or clean sand to cover any excess bituminous binder that rises to the surface.
- For processing any related damage claims, consult with the district claims officer when the following conditions exist:
  1. Damage has been caused by screenings or bituminous binder.
  2. The contract contains provisions for deducting funds from contract payments to pay for damage claims.

4-3702C Measurement and Payment

For measurement and payment, do the following:

- Collect weight slips from each truck as it delivers screenings to the chip spreader. When screenings are stockpiled before spreading, obtain weight slips for trucks delivering screenings to stockpiles. Determine the weight of unused screenings remaining in stockpiles so that the weight of unused material may be deducted from the delivered weight. From the weight of screenings to be paid for, do not deduct the weight of excess screenings removed from the roadway and disposed of.
- Collect weight slips and “weigh-back” slips for trucks delivering asphaltic emulsion or liquid asphalt. When additional water is added to asphaltic emulsion, calculate the amount to be deducted from the original weight, using the ratio in the original mix of asphaltic emulsion to water.

4-3703 Slurry Seal

The following covers the duties required throughout each phase of the project for slurry seal.

4-3703A Before Work Begins

Before work begins, take the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists slurry seal materials.
- Receive and review the mix design and laboratory tests from the contractor. After determining that the design and test results conform to the requirements in Section 37-2.03, "Mix Design," of the *Standard Specifications*, approve the mix design in a timely manner. Determine the percentage of asphalt binder to be used and notify the contractor.
- Ensure the aggregate comes from a permitted site that complies with the Surface Mining and Reclamation Act of 1975. Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. You can obtain this list from the Division of Construction or the Department of Conservation's web site at http://www.consrv.ca.gov/omr/SMARA/3098-list.
- Obtain initial samples of the aggregate, and test the samples for the specified attributes. Advise the contractor of the test results.
- Examine the surface to be sealed. Prepare a contract change order to provide for any necessary corrective action, such as sealing cracks and repairing failed areas. At this stage, a joint review with the maintenance region manager or area superintendent would be helpful.
- Examine the proposed mixing equipment to ensure compliance with the specifications. Mixer-spreader trucks must be calibrated for each material source in accordance with California Test 109, "Test for Weighing and Measuring Devices." Request assistance from the district weights and measures coordinator for calibrating and checking the accuracy of weighing and metering devices.
- Discuss with the contractor the proposed operation, and determine the method for measuring the weight of aggregate and asphaltic emulsion.
- Determine whether the surface to be sealed is clean and dry. Ensure the contractor cleans the surface to remove all loose particles of pavement, dirt, and other extraneous material.
- Review the project to ascertain all requirements for handling traffic. Review with the contractor the required traffic control system and traffic control devices.
- Advise the contractor of the exact spread rate to be used.

4-3703B During the Course of Work

Once work begins, take the following steps:

- If required under the contract, ensure the pavement surface to be treated has been coated with the specified asphaltic emulsion. Advise the contractor of the exact application rate and water amount to be added.

- Obtain the required test report for each truckload of asphaltic emulsion. Compare the report with the specifications. Do not permit the emulsion to be used before testing unless a Certificate of Compliance accompanies it.
- Before mixing, take samples of the aggregate for testing.
- If the results of grading or sand equivalent tests fail to meet the specifications, order the removal of the slurry seal represented by the failing tests. When the contractor requests in writing that the material remain in place, decide whether to reject the represented material or to allow it to remain in place. If you allow the material to remain in place, your decision must be based on the results of a physical examination of the slurry seal. Look for evidence of bleeding, raveling, stripping, or other deficiencies. Notify the contractor in writing of your decision. Also, if you allow the material to remain in place, calculate the amount of material represented, and deduct the amount from future progress payments.
- Observe the mixing operation to ensure the ordered proportions are being used.
- To determine the bitumen ratio and uniformity of mixing, submit samples of the completed mix to the district laboratory. Place samples in tightly closed containers to prevent moisture loss before testing.
- Make the necessary measurements and calculations to ensure the contractor spreads the slurry seal at the ordered rate.
- Review the completed slurry seal to determine if it meets the requirements of Section 37-2.04, "Proportioning," of the *Standard Specifications*.
- As specified, order the contractor to protect fresh slurry seal from traffic damage. To protect the fresh slurry seal, sand may be applied to the surface at intersections and driveways as specified.

4-3703C Measurement and Payment

For measurement and payment, do the following:

- The quantity of slurry seal to be paid for is the combined quantity of asphaltic emulsion and aggregate. Because of the type of equipment used and the nature of the slurry seal operation, it is usually impossible to weigh both components together. Separately determine the mass of asphaltic emulsion and aggregate, and add the two results together to determine the pay quantity.
- As necessary to determine pay quantities, collect weight tickets for aggregate and asphaltic emulsion. You may use properly sealed and calibrated metering devices to determine pay quantities. When converting volume measurements of asphaltic emulsion to mass, make the appropriate corrections for temperature.
- When slurry seal is allowed to remain in place even though it failed the grading or sand equivalent tests, make the appropriate administrative deduction.

Section 39 Asphalt Concrete

4-3901 General

4-3902 Before Work Begins
4-3902A General
4-3902B Initial Sampling and Testing
4-3902C Design of Mixes
4-3902D Plant Operations
4-3902E Street Operations

4-3903 During the Course of Work
4-3903A Plant Operations
4-3903B Street Operations

4-3904 Measurement and Payment

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.
- 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.
- 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

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.

Section 40 Portland Cement Concrete Pavement

4-4001 General

4-4002 Before Work Begins

4-4003 During the Course of Work

4-4004 Measurement and Payment

4-4004A Measurement of Pavement Thickness
4-4004A (1) Location of Primary Cores
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4-4004A (3) Thickness Variation
4-4004B Calculation of Deductions in Payment to the Contractor for Deficient Thickness
4-4004B (1) Adjustment When None of the Primary Cores Is Deficient in Thickness by More Than 15 mm
4-4004B (2) Adjustment When One or More of the Primary Cores Is Deficient in Thickness by More Than 15 mm
4-4004C Handling of Skips in the Original Day's Pour and Secondary Areas to Be Removed and Replaced
4-4004D Handling Deficient Areas Not Cored
4-4004E Administration

Section 40 Portland Cement Concrete Pavement

Section 40 Portland Cement Concrete Pavement

4-4001 General

4-4001 General

This section covers portland cement concrete pavement. A concrete paving operation includes the following:

- The production of the portland cement concrete
- The placing, finishing, and curing of the concrete pavement
- The concrete pavement subgrade
- The specified equipment
- The construction of joints
- The protection of the pavement

Plant inspection specialists and acceptance testers not directly assigned to the resident engineer usually perform inspection and testing duties at the concrete batch plant. However, in addition to on-site inspection, mix design and plant inspection are part of the resident engineer's responsibility. Good communication is essential between plant and inspection specialists and assistant resident engineers. The resident engineer must be kept informed of test results in a timely manner.

This section will mostly cover on-site inspection duties. For information on producing and transporting portland cement concrete, see Section 4-90, "Portland Cement Concrete," of the *Construction Manual* (manual).

4-4002 Before Work Begins

4-4002 Before work begins

Before work begins, do the following:

- Review the plans and specifications to determine the requirements for portland cement concrete pavement, including thickness requirements, joint and tie bar details, and cement content requirements.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists materials for portland cement concrete pavement.
- Check to ensure the aggregate source is a permitted site in compliance with the Surface Mining and Reclamation Act of 1975. Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. You can obtain this list from the Division of Construction or the Department of Conservation's web site at http://www.consrv.ca.gov/omr/SMARA/3098-list.

- The specified cement content is based on the best information available to the project design engineer. The procedure to determine the actual cement content that will be used is as follows:

  1. To determine whether the cement content for the pavement is being reviewed, contact the Office of Materials Engineering and Testing Services (METS) at least 70 days before paving begins. The resident engineer must ensure the process has started. The district materials engineer may be a good initial contact.

  2. METS may perform the required testing to determine cement content or may establish cement content based on previous testing of aggregates from the same source. If METS has received Form CEM 3101, "Notice of Materials to Be Used," action will probably have been initiated to determine the cement content. If METS needs samples of aggregate for testing, the resident engineer will be advised. Either district materials laboratory personnel or project personnel may obtain the samples.

  3. The resident engineer will be advised of the recommended cement content. If the recommended cement content and the specified cement content are different, prepare a contract change order to provide an adjustment in compensation in accordance with Section 40-1.015, "Cement Content," of the *Standard Specifications*.

- Obtain initial samples and design the mix as covered in Section 4-90, "Portland Cement Concrete," of this manual. For assistance with the mix design process when needed, contact the district materials engineer or responsible unit.

- Well before paving begins, contact the district materials engineer to make arrangements for measuring pavement thickness. Personnel from the district materials laboratory or METS may take core samples for thickness measurements or you may need to initiate a service contract for taking core samples.

- Decide whether crossings will be necessary for the convenience of public traffic and whether Type III portland cement should be used for such crossings. Advise the contractor accordingly.

- Examine the equipment or tools to be used. When obvious inadequacies exist, advise the contractor and enter the details in the daily report. More specifically, do the following in examining equipment or tools:

  1. For side-form construction:

     a. Examine the forms to ensure the specified attributes, including those for composition, weight, dimensions, and rigidity. Ensure the forms are cleaned and oiled before each use.

     b. Ensure that installation of the forms complies with the specifications. Order any necessary corrective work before the placement of concrete.

     c. Inspect the paving equipment for specification compliance.

  2. For slip-form construction, examine the paver for the specified attributes. Require the specified demonstration of satisfactory operation and note such activity in the daily report.

3. To ensure compliance with the requirements for protecting pavement, examine all equipment that will bear on previously completed pavement.

- Before the start of paving, check the accuracy of the final grade stakes.
- Inspect the subgrade to ensure compliance with the specified tolerances for compaction and elevation. Ensure that any low areas are identified in a manner that will result in placing additional concrete as specified. Such additional thickness is considered paid for as part of the lower layer and must not be included when calculating pavement thickness. (See the specifications for cement-treated base, lean concrete base, and treated permeable bases.)
- To maintain the concrete pavement at the thickness specified, the contractor may adjust the planned finished grade provided two conditions are met:

  1. All lower layers have been constructed to at least the minimum required elevations.
  2. Such adjustments do not result in abrupt changes in grade or adversely affect smoothness.

- An acceptable general practice is to limit any such adjustment so that the planned finished grade does not change more than 10 mm in 15 m longitudinally.
- When slip-form pavers are used, inspect the grade upon which the paver will ride to determine if the grade is smooth enough to prevent abrupt vertical changes in the finished surface. When a wire controls the grade and alignment of the paver, check the wire for any obvious variations. Ensure the wire is tensioned sufficiently to prevent any measurable sag between supporting stakes. Advise the contractor if you anticipate any problems. Keep in mind that the contractor is responsible for the thickness and smoothness of the pavement.
- For determining pavement thickness (not for providing a seal), require the contractor to coat the surface of cement-treated permeable base with asphaltic emulsion.
- Ensure the contractor correctly applies the bond breaker material to the surface of lean concrete base.
- When pavement is to be placed during periods of low ambient temperatures, require the contractor to submit a written outline of proposed methods for protecting the concrete.
- Ascertain the curing method that the contractor proposes to use. When curing compound will be used, discuss with the contractor the labeling and packaging requirements for acceptance of the compound.
- Ensure the equipment for applying curing seal complies with the specifications.
- Before paving begins, ensure that the equipment for constructing joints is on-site and that it conforms to specifications.
- Before paving begins, ensure that equipment that meets the requirements of Section 90-7.01A, “Water Method,” of the *Standard Specifications* is on-site.
- If paving or finishing operations will extend beyond daylight hours, ensure that adequate lighting facilities are on the project before paving begins.
- When required, ensure that tie bars and dowels are on hand and conform to specifications.

- When long hauls are involved, review the contractor's proposed placement method to ensure adequate time will be available.
- Arrange for plant inspection and testing personnel to be present at the plant before start up.
- For California Test 523, "Flexural Strength of Concrete (Using Simple Beam with Center-point Loading)," select a location to store concrete beams. A good location is one that is convenient to a water source and removed from any traffic. Require the contractor to supply sufficient sand or earth for burying the beams. Arrange for the contractor to also supply labor for assistance with transporting and burying the beams. Note the safety precautions in the test method.
- Before placing concrete, require that the subgrade be uniformly moist.

4-4003 During the Course of Work

4-4003 During the Course of Work

During work, do the following:

- Before mixing, obtain samples of the aggregate, and test for the specified attributes in accordance with the frequency shown in Section 6-1, "Sample Types and Frequencies," of this manual. Initially, and in the case of borderline material, obtain and save additional samples so that if the first samples tested do not meet the requirements for contract acceptance, the extra samples may be tested to determine the extent of the failing material.
- When the results of grading tests, sand equivalent tests, or both are outside the limits for contract compliance, you must determine whether the portland cement concrete represented by the tests is structurally adequate. When concrete pavement that does not meet contract compliance is left in place, the contractor's specified payment is to be made by administrative deduction. Ensure the reasons for leaving the concrete in place are fully documented, and notify the contractor of your decision and the deduction amount to be made.
- Before accepting lower limits for the cleanness value and sand equivalent value in accordance with Section 90-2.02A, "Coarse Aggregate," and Section 90-2.02B, "Fine Aggregate," of the *Standard Specifications*, ensure the contractor complies fully with the requirements for certificates of compliance.
- See Section 4-90, "Portland Cement Concrete," of this manual for a discussion of transporting concrete and receiving load tickets at the delivery point. Decide if delivery tickets should be required.
- Engineers inspecting the placing portion of the operation must maintain good contact with engineers inspecting operations at the mixing plant, so that any problems related to mixing or hauling may be addressed and corrected.
- Observe the concrete as it is placed for any improper proportions or inadequate mixing. In the daily report, record the reasons for any concrete rejection and the approximate amount involved.
- Ensure the contractor furnishes the required tachometer. Also, ensure the contractor does the vibrating at the locations and in the frequencies and amplitudes specified. Be alert for inoperative units, and have them replaced immediately.
- Obtain samples of the concrete, and perform tests in accordance with the frequencies shown in Section 6-1 of this manual.

- Observe the operation of equipment that bears on existing pavements to ensure that no cracking or other damage occurs. If damage does occur, order immediate corrective action.
- Ensure that dowels and tie bars are not displaced during the pour.
- When joints are to be formed rather than sawed, ensure the joint material is placed as specified.
- At the start of each day's work, ensure that the specified date stamp is used to mark the new pavement.
- Ensure the contractor constructs a contact joint whenever a time interval is greater than that allowed by the specifications between any two successive concrete loads.
- Measure the pavement's width at the beginning of paving and periodically thereafter. While the required width applies to both upper and lower surfaces, the bottom width can be greater than specified to reduce edge slump.
- Ensure the contractor performs the preliminary finishing according to specifications and in a manner that will impart the desired surface characteristics.
- Encourage the contractor to construct the pavement so that before final finishing it meets the requirements for profile index, straightedge, and edge slump.
- During your observations, consider the following information:

  1. Pavement can be durable but have inadequate texture, or be well-textured and not possess enough durability to retain the texture.
  2. One of the things that reduces surface durability is mixing water with the surface mortar during finishing. This mixture may "bleed" water that has not evaporated water added to the surface to make finishing easier, or water added to prevent hairline cracking and checking.
  3. If any of the concrete visible during finishing is more dilute than the mortar of the freshly placed concrete, too much water is being mixed into the surface. Telltale signs of unacceptable practice include the following:

     a. Soupy mortar during finishing

     b. Excess laitance

     c. Small scallops in the slab's edge

     d. Areas in the finished surface that are still soft and wet while the surrounding area has turned firm and lost its watery sheen

  4. Standing bleed water may appear on the surface under certain conditions shortly after pavement is placed. To avoid mixing bleed water with surface grout, preliminary finishing should be completed before bleeding progresses to this degree.

5. Water applied for the convenience of finishing, not otherwise necessary to produce the product specified, is contrary to specifications regarding the use of water for retempering. The engineer must control the amount of any necessary fogging.

- Ensure the contractor performs the final finishing as specified and in a manner that will result in a finished surface with the desired characteristics.
- When sufficient rain may fall to damage fresh pavement, as defined in the specifications for protecting concrete, stop the placing or ensure other steps are taken (such as placing a covering) to prevent damage.
- Before texturing, ensure the contractor rounds the pavement edges to the specified radii. Observe texturing for compliance with requirements. Initial texturing is to be done with a broom or burlap drag so as to produce striations parallel with the centerline.
- Ensure burlap drags are used as specified and kept sufficiently clean to avoid unsightly irregularities in the texture. Brooms used instead of burlap drags also must be kept sufficiently clean to avoid significant irregularities. Final texturing must be done with spring steel tines that produce grooves parallel with the centerline. Grooves that are not straight and parallel to the centerline are unacceptable. Ensure the cross section of the steel tines complies with the specifications. Inspect the pavement surface to ensure the grooves meet the specified depth.
- Both before and after the application of curing seal, ensure the contractor keeps the pavement surface moist as specified.
- Ensure the contractor uses one of the curing methods specified in Section 90-7.02, "Curing Pavement," of the *Standard Specifications*. During your observations, also do the following:

1. Waterproof Membrane:

   a. Before placing the membrane, ensure the contractor sprays the concrete with a mist of water until the concrete has set.

   b. Examine waterproof paper or plastic sheeting to ensure it meets specifications. If you need assistance, consult with the district materials engineer.

   c. Ensure that sheeting material is placed and secured and that any damaged sheeting is repaired as required in the specifications. Ensure the contractor adheres to the specified curing period.

2. Curing Compound:

   a. Examine shipments of curing compound to ensure the compound is labeled and packaged as specified. If the compound is shipped in tanks or tank trucks, obtain a copy of the shipping invoice, and determine whether it contains the specified information. Prohibit the use of improperly identified curing compound until it has been sampled and tested. See Section 6-2, "Acceptance of Material and Sampling Methods," of this manual for procedures.

b. For acceptance tests, obtain samples of the curing compound as required under Section 6-1, “Sample Types and Frequencies,” of this manual.

c. Ensure the contractor uniformly applies the curing compound at the specified time. See that sawed cuts, or any other areas that have been disturbed, receive additional curing compound. Your inspection should ensure the following attributes for the compound:

(1) It is not contaminated, diluted, or altered in any way before application.

(2) It is mixed thoroughly before application.

(3) It is applied when concrete surfaces are still visibly moist.

(4) The curing film remains unbroken for the specified duration of curing.

d. Perform measurements and calculations for the curing seal’s application rate. To determine the application rate, you may also use California Test 535, “Determining the Application Rates of Concrete Curing Compounds in the Field”. Record such measurements in the daily report.

e. Decide whether fogging the concrete pavement will be necessary after the curing seal has been applied, as described in Section 90-7.02, “Curing Pavement,” of the *Standard Specifications*.

- Observe the sawing of weakened plane joints. Check the spacing and location for conformance with the plans. Measure the cuts to determine whether they meet the specified dimensions. Sawed-joint specifications regarding depth and width apply to the completed joint. During your inspection of the sawing of weakened plane joints, also do the following:

  1. Since joint saws commonly employ multiple blades, ensure that each one cuts to the specified width and depth. Frequently, portions of joints cut by different blades do not meet. If so, you will need to order blade realignment.

  2. Although the contractor is responsible for controlling the exact time of sawing weakened plane joints, ensure that sawing is completed within the time limits specified. Control joints, because of their function to relieve early drying and thermal shrinkage stresses, must be cut soon after the concrete has hardened enough to support the saw.

  3. When volunteer cracking starts, the slab is in tension and further sawing will result in cracks ahead of the saw cut.

- With the district materials engineer, arrange to measure the coefficient of friction (California Test 342, “Surface Skid Resistance with the California Portable Skid Tester”). Also, note the following:

  1. Areas with uniform surface texture require testing only at representative locations to ensure that the required coefficient of friction has been provided. Test areas with visibly smoother texture as completely as necessary to ensure compliance or to delineate areas that must be corrected.

2. Tests made at temperatures below 4.5°C will yield low results; therefore, do not rely on such tests as indications of failure. However, you may use values higher than the required minimum to indicate compliance even if you made measurements at temperatures below 4.5°C.

3. To determine whether the contractor's method of texturing is capable of producing the specified results, perform some tests as soon as possible after paving begins. Note that tests performed before the concrete is seven days old are not valid for acceptance. Whenever early tests are performed, advise the contractor that such areas are subject to retesting. If the contractor has used the pavement for hauling or conducted any operation that could reduce the friction factor from the one originally determined, retest such areas before opening them to public traffic.

- Make arrangements with the district materials laboratory to make thickness measurements of the completed concrete pavement. For more details about pavement thickness measurements, see the information under the heading "Measurement and Payment" below. In general, perform coring as soon as practical, with due consideration for the reasonable employment of coring crews and efficiency of operation. If the paving operation is going to last more than a few days, make a reasonable effort to obtain the first cores at an early date for the informational value to the resident engineer and contractor. Do not allow coring machines on fresh concrete while any danger exists of damaging the concrete. Seventy-two hours is considered the minimum period to wait.

- Measure the finished surface with a straightedge, especially at contact joints, to determine compliance with the specifications. The pavement's final surface must comply with both the straightedge and profilograph requirements.

- Observe the contractor's pavement profiling operation. Ensure that the profilograph is calibrated and that the contractor operates the profilograph in accordance with California Test 526, "Operation of California Profilograph and Evaluation of Profiles". The contractor is responsible for controlling and performing all the intermediate steps necessary to produce final profilograms that indicate the pavement surface is within the profile index specified. Read the final profilograms in a timely manner. Inform the contractor if the profile index is acceptable or if further grinding is required. Record details of the contractor's profilograph operation, corrective measures, and final profilogram results in the daily report.

- Ensure the concrete pavement is protected as specified. Make additional sets of beams to determine acceptable flexural strength when pavement crossings are to be opened to public traffic or to job traffic earlier than normally permitted.

- Before opening the pavement to public traffic, require the contractor to repair spalls, raveling, and tearing in sawed joints, as specified.

- Ensure that end anchors are constructed at all required locations and to the dimensions shown on the plans. Ensure transverse contact joints are constructed and tie bars and dowels are placed as shown on the plans. When required, ensure that pressure relief joints are constructed as specified and shown on the plans.

4-4004 Measurement and Payment

4-4004 Measurement and Payment

Using the dimensions shown on the plans, calculate the quantity of portland cement concrete pavement to be paid for. Use curve corrections to ensure the calculations account for curves in alignment. Make deductions from contract payments for deficient pavement thickness.

4-4004A Measurement of Pavement Thickness

Cores taken in each primary unit of pavement at the minimum rate specified, and additional cores in primary unit areas taken at the contractor's request, are referred to as primary cores.

Primary cores do not include cores taken for secondary thickness measurements. Cores taken for secondary thickness measurements, and cores taken to determine the limits of secondary units, are referred to as secondary cores.

Before coring begins in primary units, designate areas where coring is excluded. Limit excluded areas to the following:

- Dig-out spots in the subgrade
- Thickened slabs at bridge approaches
- End anchors
- Any local areas where authorized modifications to the planned pavement thickness have been permitted

Do not exclude portions of the primary unit where equipment had difficulty or where other unauthorized deviations from planned pavement thickness occurred.

4-4004A (1) Location of Primary Cores

Do the following to locate primary cores:

- For each day of paving, determine the net length of pavement placed, excluding the length of structures and other areas upon which pavement is not placed during that day. The resulting measurement is the length of the primary unit. Multiply the net length by the number of lanes in the primary unit. Divide that number by 300 m and take the next highest whole number. The resulting number is the number of primary cores to be taken, unless the contractor requests additional cores.
- Divide the net length of the primary unit by the number of primary cores to be taken in that unit. The resulting distance will be referred to as the primary coring interval.

Locate the first core in any primary unit by starting at either end of the unit (preferably proceeding in the direction of increasing stations), and select any lane at random. Select any factor from the longitudinal factors shown in Table 4-40.1, "Calculation Factors to Locate Cores." Multiply the factor by the primary coring interval. The result will be the distance from the beginning of the primary unit to the first core. (Any random method of selecting the longitudinal location of the first core is within the intent of the specification.) Determine the lateral location of the first core by selecting a value from the lateral column shown in Table 4-40.1 and measuring that distance from the right-hand edge (when looking ahead) of the lane selected.

Table 4-40.1 Calculation Factors to Locate Cores

Longitudinal (Factor)	Lateral (Meters)
0.6	1.8
0.1	3.0
0.2	0.6
0.9	2.7
0.5	1.5
0.7	2.1
0.4	1.2
0.8	2.4
0.3	0.9

- In turn, locate the remaining primary cores in the lanes. Space them uniformly, from the first core in the unit, at longitudinal intervals equal in length to the primary coring interval for the unit. Then locate them laterally within each lane in the manner used for the first core by applying successive values from the lateral factors in table 4-40.1. All values in the table are to be used successively for each primary unit throughout the project after the value for the first core in the unit is selected at random. The location of each core should be spotted on the pavement within "pacing accuracy" longitudinally and within about 0.3 m laterally.

4-4004A (2) Location of Secondary Cores

To determine the limits of secondary units, locate cores approximately in the center of each adjacent panel.

4-4004A (3) Thickness Variation

For all cores, determine the pavement thickness variation by subtracting the specified thickness of pavement from the thickness determined by core measurements. (Record excess thickness by using the plus sign and deficient thickness using the minus sign.)

4-4004B Calculation of Deductions in Payment to the Contractor for Deficient Thickness

The following covers the steps to take when calculating deductions in payment based on deficient thickness:

4-4004B (1) Adjustment When None of the Primary Cores Is Deficient in Thickness by More Than 15 mm

The following describes how to make an adjustment when none of the primary cores are deficient in thickness by more than 15 mm:

- To determine the average thickness deficiency, if any, for the primary unit, average the thickness variations of all primary cores. Record this value to the nearest 2.5 mm. If the average thickness deficiency is less than 2.5 mm, do not make a deficiency adjustment. If the average thickness deficiency is more than 2.5 mm, continue with the steps in the bullets below.

- To obtain the deficiency adjustment in dollars per square meter, use the table in Section 40-1.135A, "Thickness Deficiency of Not More Than 15 mm," of the *Standard Specifications*.

- To obtain the total amount of payment to be deducted for the primary unit, multiply the deficiency adjustment by the total area of the primary unit in square meters.

4-4004B (2) Adjustment When One or More of the Primary Cores Is Deficient in Thickness by More Than 15 mm

When one or more cores are deficient in thickness by more than 15 mm, determine the total adjustment by using the following procedure:

- To determine the secondary unit adjustment, multiply the area of any panels deficient in thickness by more than 15 mm that are allowed to remain in place by the dollar figure specified in Section 40-1.135B, "Thickness Deficiency of More Than 15 mm," of the *Standard Specifications*.
- In the calculation to determine average thickness of the primary unit, use the average thickness of all secondary cores outside each secondary unit to replace the thickness of the initial core within that secondary unit.
- To determine the primary unit deduction, multiply the primary unit area, excluding any secondary unit areas, by the appropriate factor (if any) in the table in Section 40-1.135A, "Thickness Deficiency of Not More Than 15 mm," of the *Standard Specifications*.
- To determine the total deduction, add the deductions for the primary unit, any secondary units, and the cost of all secondary cores, including those taken outside secondary units.

The following is an example illustrating the procedure for measuring the pavement for thickness and calculating deductions for thickness deficiencies. The procedures and the dollar figures used for deductions from payments to the contractor used in the example are based on Section 40-1.135, "Pavement Thickness" of the *Standard Specifications(1999 edition)*.

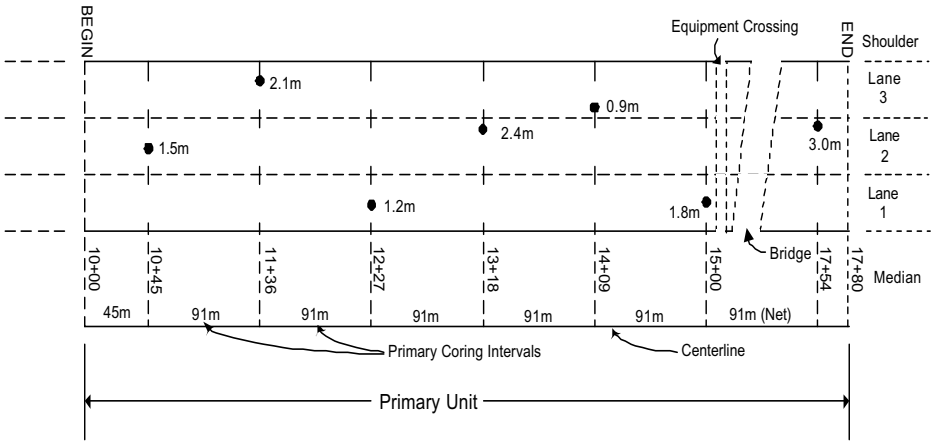
Assume the following:

The contractor paved three lanes (lanes 1, 2, and 3) from Station 10+00 to Station 17+80. An equipment crossing and a bridge within the limits of the day's run caused "skips" in the length paved totaling 140 m. The actual length paved was 640 m.

The engineer calculated the number of cores required for thickness measurements in the primary unit and the core interval. To determine the location of the first core, the engineer chose the center lane (Lane 2), at random, and used the fifth set of numbers, at random, from Table 4-40.1 "Calculation Factors to Locate Cores." The first core was taken at a longitudinal distance from the beginning of 45 m (approximately the core interval) and at a lateral distance of 1.5 m from the right edge of the lane. Figure 4-40.1, "Primary Core Locations", illustrates the primary unit and the location of all the primary cores.

Figure 4-40.1

Primary Core Locations



a. Length of Primary Unit = 640 m

b. Number of Cores

$$\frac{3 \text{ lanes} \times 640\text{m}}{300} = 7 \text{ cores}$$

$$\frac{640\text{m}}{7 \text{ cores}} = 91.4 \text{ meters/core, use } 91\text{m}$$

c. Location of the First Primary Core

In this example the center lane is chosen (at random), and the fifth set of numbers(at random) from the table above is used. The first core is taken at a longitudinal distance from the beginning of 45.5m (0.5 x 91m). A distance rounded to 45m is used in the example.
The first core is taken 1.5m from the right edge of the lane.

The core thickness variations for the respective numbered cores were determined as follows:

Core Number	Thickness Variation
1.	-7.5 mm
2.	+5 mm
3.	+7.5 mm (use +5 mm)
4.	-7.5 mm
5.	-10 mm
6.	-0 mm
7.	-20 mm

Core 3 is more than 5 mm greater than the specified thickness, so + 5 mm was used in the calculation to determine thickness deficiency in the primary unit in accordance with Section 40-1.135A, "Thickness Deficiency of Not More Than 15 mm" of the Standard Specifications.

Core 7 was deficient by more than 15 mm. Because of this deficiency, the next step was to determine, from secondary thickness measurements, the dimensions of the secondary unit.

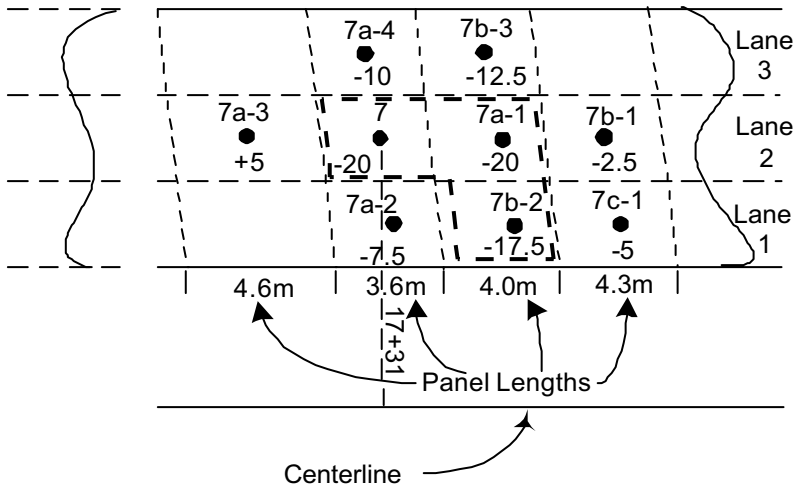
To determine the limits of the secondary unit, the resident engineer ordered secondary thickness measurements to be made in the panels adjacent to the panel in which Core 7 was taken. Subsequent thickness measurements were made in panels adjacent to any of these panels that had thickness deficiencies of more than 15 mm. This process continued until the secondary unit was bounded by panels in which the secondary measurements were deficient in thickness by 15 mm, or less. The following columns show the resulting thickness variations in the secondary cores:

Core Number	Thickness Variation
7a-1	-20 mm
7a-2	-7.5 mm
7a-3	+5 mm
7a-4	-10 mm
7b-1	-2.5 mm
7b-2	-17.5 mm
7b-3	-12.5 mm
7c-1	-5 mm

Figure 4-40.2, “Location of Secondary Cores,” illustrates the secondary unit and the location of the panels in which secondary measurements were made.

Figure 4-40.2

Location of Secondary Cores



The panels in the secondary area, represented by cores 7, 7a-1, and 7b-2, were measured and found to be 42 m.

The engineer averaged the thickness variations of the secondary thickness measurements outside of the secondary unit area. The resulting value was used, in lieu of the thickness variation for Core 7, in the calculation to determine the average thickness deficiency of the primary unit area. The core thickness variations in the panels surrounding the secondary unit are tabulated below.

Core Number	Thickness Variation
7a-2	**-7.5**
7a-3	**+5 mm**
7a-4	**-10 mm**
7b-1	**-2.5 mm**
7b-3	**-12.5 mm**
7c-1	**-5 mm**

The average of the thickness variations in the above table is –5.4 mm. This average was rounded down to –5.0 mm, and that value was used for the thickness variation for Core 7 in the primary unit.

Using –5 mm for the Core 7 thickness deficiency, the engineer calculated the average thickness deficiency (cores 1 through7) for the primary area to be –2.8 mm. This average was rounded down, and –2.5 mm was used for the thickness deficiency for the primary unit.

The remaining area of the primary unit, after the area of the secondary unit was subtracted, was as follows:

640 x 3 x 3.6 – 42 = 6,870 m.

The deduction from payment to the contractor for thickness deficiency in the primary area in accordance with Section 40-1.135A, "Thickness Deficiency of Not More Than 15 mm," of the *Standard Specifications* was calculated as follows:

6,870 m x $0.40 = $2,748.00

The engineer determined that the concrete in the secondary unit could be left in place. The deduction from payment to the contractor for the secondary unit, in accordance with Section 40-1.135B, "Thickness Deficiency of More Than 15 mm," of the *Standard Specifications,* was calculated as follows:

42 m x $32.50 = $1365.00

In addition to the deductions for pavement thickness deficiencies in the primary and secondary units, a deduction from payment to the contractor was made for the cost of all secondary thickness measurements. The cost of secondary thickness measurements was the cost of cores 7a-1 through 7a-4, 7b-1 through 7b-3, and 7c-1.

4-4004B (3) Contractor's Requests for Additional Thickness Measurements

If, after the primary coring is performed, the contractor requests additional thickness measurements within any primary unit, treat this request as a request for doubling the frequency of coring in the primary unit area. Locate the additional cores in a manner similar to that used for locating the primary cores. This approach will halve the interval distance between primary cores. To calculate the deficiency adjustment, do not separately consider additional cores that are deficient in thickness by no more than 15 mm. Instead, include these cores with the original primary cores. If any additional cores are deficient in thickness by more than 15 mm, determine the limits of the secondary areas.

Do not grant permission to any request from the contractor for selective coring. However, if the contractor requests additional thickness measurements before the performance of any of the primary coring, you may shorten the length of the coring interval for the primary unit accordingly. For example, the contractor may request a rate of one core for each 200 m of traffic lane rather than one core for each 300 m. This request will have the effect of increasing, but not necessarily doubling, the number of cores.

Deduct from the payment to the contractor the cost of all additional thickness measurements that resulted from the contractor's request.

If a contractor requests more than one round of additional cores, consult with the construction field coordinator before granting permission.

4-4004C Handling of Skips in the Original Day's Pour and Secondary Areas to Be Removed and Replaced

Skips (such as gaps left for traffic or equipment crossing, short distances between adjacent bridges, and secondary areas to be removed and replaced) ultimately are poured at a later date. The net area of such pavement placed in any one day technically becomes a primary unit area and, as such, is subject to the specifications regarding thickness measurements. Use judgment regarding which of these areas are of sufficient size to warrant thickness coring. In general, any area excluded from final coring should be small, and you must have other measurements to confirm that the thickness of the pavement is not deficient.

4-4004D Handling Deficient Areas Not Cored

When you have specific knowledge of areas deficient in thickness and you have records of the extent of such deficiency, exclude these areas from the random coring. Make the deficiency adjustment on the average thickness deficiency in the same manner as for areas that have been cored.

4-4004E Administration

Notify the contractor in writing of the date and place where coring will be performed. Follow up verbally, if necessary, to be certain that the contractor knows when and where coring will take place.

After measuring and recording pavement thickness, retain the cores until final agreement is reached on the payment for the portland cement concrete pavement. (Usually, final agreement is reached once the contractor returns the proposed final estimate.)

The personnel who measure core thickness prepare the coring records, which include information about the cores' location and measured thickness. The original records and one copy are given to the resident engineer, who will retain the original and forward the copy to the contractor. Personnel from the district materials laboratory will keep one copy and another copy is sent to METS in Sacramento.

Use Form TL-3096, "Pavement Core Record," which must include sketches showing the location of the cores. Separate reports should be prepared and identified for secondary area measurements. These reports will assist in determining the cost to the contractor for secondary coring and will provide a clear record of such secondary areas. Follow the same distribution of copies as for primary unit reports (as described in the previous paragraph).

Section 41 Pavement Subsealing and Jacking

Section 41 Pavement Subsealing and Jacking

4-4101 General

4-4101 General

Pavement subsealing and jacking are techniques used in rehabilitating concrete pavement. The same equipment and materials are used in both operations. Subsealing fills voids under the pavement without disturbing the elevation of the finished surface. Jacking fills any voids that may be present under the pavement and also raises the finished surface of the pavement to a desired elevation. In both operations, holes are drilled to a specified depth below the pavement surface, and grout is pumped under pressure into the holes.

The special provisions will indicate whether pavement subsealing or pavement jacking is to be performed.

4-4102 Before Work Begins

4-4102 Before Work Begins

Before work begins, take the following steps:

- Review the contract plans and specifications for all contract requirements including those covering traffic handling, equipment, and materials to be used.
- Verify that the plan to control water pollution is approved and in place.
- Verify that all materials to be used are included on Form CEM-3101, “Notice of Materials To Be Used,” and that the form has been received and properly distributed.
- Review the contractor’s proposal for materials to be used and for the required data from an independent laboratory test.
- Verify that the materials the contractor plans to use comply with Section 41-1.02, “Materials,” of the *Standard Specifications*. Ensure that the proposed brands of fly ash and admixtures are on the current list of approved brands.
- Require certificates of compliance for fly ash, admixtures, and cement.
- Inspect packaged fly ash, cement, or combined fly ash and cement to determine that these materials are labeled as required in the specifications. For proper labeling, also collect and review shipping invoices for fly ash and cement delivered in bulk.
- Examine the contractor’s equipment to determine that it meets specified requirements.
- Discuss traffic handling with the contractor, and review the contractor’s plan for lane closures. See sections 4-12, “Construction Area Traffic Control Devices” and 2-2, “Traffic,” of the *Construction Manual* for a discussion of traffic handling devices and lane closure procedures.

- Check the existing condition of the pavement, and revise areas to be jacked or grouted as needed.
- Check for the presence of traffic loop detectors.
- Check the plans for the pattern and location of holes.
- Check the contractor's actual layout of hole locations to see that it conforms to the planned pattern.
- Establish vertical control for pavement jacking.
- Verify that the atmospheric and subgrade temperatures are above the specified minimums and that before beginning jacking or subsealing, weather conditions are suitable.

4-4103 During the Course of Work

4-4103 During the Course of Work

During the work, do the following:

- Verify that the mixer operates within the specified rpm.
- Verify that the pump can sustain the specified gauge pressure.
- Verify that the washing device meets the specified number of jets and that the contractor operates it as the specifications require.
- Perform California Test 541, "Flow of Grout Mixtures (Flow Cone Method)" to determine that the efflux time is within the required range during grouting operations.
- Monitor the slab for movement during subsealing. Also, observe and monitor the contractor's string lines during jacking to determine when the slab has been raised to the established grade.
- Monitor grout mixing so that grout not used within the specified time is disposed of properly.

4-4104 Measurement and Payment

4-4104 Measurement and Payment

Count the number of holes drilled. Verify that the holes to be paid for are only those holes shown on the plans or those ordered to be drilled.

Also, count bags of packaged fly ash and cement to determine pay quantities. During counting, ensure that duplication or omission does not occur. Collect weigh tickets for materials delivered in bulk, and remember to deduct quantities of materials not used or wasted.

Section 42 Groove and Grind Pavement

Section 42
Groove and Grind
Pavement

4-4201 General

4-4201
General

Grooving is generally performed to increase the coefficient of friction for new or existing portland cement concrete or asphalt concrete pavement. It is one of the methods discussed in Section 611.8, "PCCP Rehabilitation Strategies," of the *Highway Design Manual*.

Grinding is generally performed to improve the riding quality of new or existing portland cement concrete or asphalt concrete pavement. Grinding may also retard structural damage at the joints of portland cement concrete pavement. Existing pavements are ground as a rehabilitation strategy. New pavements may be ground to meet smoothness requirements.

4-4202 Before Work Begins

4-4202
Before Work Begins

Review the contract plans and specifications. Also, take the following steps:

- Discuss traffic handling with the contractor and review the contractor's plan for lane closures. For a discussion of traffic handling devices and lane closure procedures, see Section 4-12, "Construction Area Traffic Control Devices," and Section 2-2, "Traffic," of the *Construction Manual* (manual).
- Before the grooving or grinding operation, inspect and locate any existing detector loops on either new or existing pavement to prevent damage to the detector loops' sealant. If detector loops are not visible, consult with the district traffic unit.
- Check local noise ordinances and review specified noise requirements.
- Before grinding, check adjacent pavement for proper drainage and smoothness.
- Verify that the required water pollution control plan is approved and in place.
- In areas to be grooved or ground, verify that yellow stripe and pavement markings do not contain lead. For instructions regarding this issue, See Section 4-15, "Existing Highway Facilities," of this manual.
- Review the project to ascertain all the requirements for handling traffic. Before permitting the contractor to begin work, require the submittal of the specified documents for allowing residue disposal outside the right-of-way.
- Ensure the contractor's equipment meets specified requirements.

4-4203 During the Course of Work

4-4203 During the Course of Work

4-4203A The following applies to both grooving and grinding operations

- Observe the operation to ensure that equipment and noise levels comply with specifications.
- Ensure that the handling of residue and dust from the operation meets specifications.
- Ensure that the grooved or ground widths meet specifications.

4-4203B When grooving is specified

- At the beginning of the work shift, check behind the grooving machine to ensure that all the blades are cutting grooves to the specified depth.
- Record the locations of omitted grooves. When specified, require the cutting of omitted grooves.

4-4203C When grinding is specified

- As work progresses, check the ground pavements with the specified straightedge.
- Determine if any abnormally depressed areas must be excluded from testing with the profilograph and the 3.6 m straightedge. Measure these areas to ensure they do not exceed the specified percentage of the total ground area.
- In accordance with California Test 526, “Operation of California Profilograph and Evaluation of Profiles,” measure ground portland cement concrete pavements for a profile index.
- Ensure ground areas on structures, approach slabs, and 15 m of approach pavement meet the smoothness and cover requirements in Section 51-1.17, “Finishing Bridge Decks,” of the *Standard Specifications.*
- In accordance with California Test 342, “Surface Skid Resistance with the California Portable Skid Test,” determine the coefficient of friction for surfaces that have been ground.

4-4204 Measurement and Payment

4-4204 Measurement and Payment

Measure both grooving and grinding by the area grooved or ground. As the work progresses, make transverse measurements to ensure the grooved or ground areas meet the widths specified. You may compute lengths by measuring the distance to start and stop locations from known stations and by computing the length grooved or ground from the stationing. Include curve corrections in the calculations.

Section 49 Piling

Section 49
Piling

4-4901 General

4-4901
General

Section 49, "Piling," of the *Standard Specifications* includes specifications for cast-in-place concrete, steel, timber, and precast prestressed concrete piling. Other materials for piling may be shown on the plans or required in the special provisions. For detailed information regarding piling, see Section 130, "Foundations," of the *Bridge Construction Records and Procedures Manual* and in the Office of Structure Construction's (OSC) *Foundation Manual*.

4-4902 Before Work Begins

4-4902
Before Work Begins

Before work begins, take the following actions:

- Review the project plans to determine the locations where piling will be installed adjacent to traffic lanes opened to the public. Before any work begins, require the contractor to submit for approval a pile-handling plan for work adjacent to traffic.
- At the start of a project, do a field review of locations where piling is to be installed, and check for overhead obstructions and underground utilities that the project plans may not have addressed. Early identification of conflicts can avoid lengthy and costly delays to the project.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists piling materials.
- For instructions on preparing pile records to be kept during piling operations, review Bridge Construction Memo 3-7.0, "Pile Records," of the *Bridge Construction Records and Procedures Manual*.

4-4903 During the Course of Work

4-4903
During the Course
of Work

Piling operations are dangerous. The OSC *Foundation Manual* contains safety information for various types of piling operations. In addition, the OSC Code of Safe Practices, on the OSC web site, contains safety guidelines to follow for various piling operations. Before the contractor's operations begin, review both sources of information, in addition to the contractor's pile-handling plan if required, in a tailgate safety meeting.

Record drilling and driving information as required in the Bridge Construction Memo 3-7.0, "Pile Records," of the *Bridge Construction Records and Procedures Manual*. At the completion of the piling operation, forward the piling information collected to the OSC office in Sacramento.

4-4904 Measurement and Payment

4-4904
Measurement
and Payment

For piling in place, measure by the meter, measuring the longest side from the tip of the pile to the plane of pile cut-off. In addition, driven piles include an additional item for driving each pile. Record information about drilling, driving, and measurements in accordance with the Bridge Construction Memo 3-7.0, "Pile Records," of the *Bridge Construction Records and Procedures Manual*.

Section 50 Prestressing Concrete

Section 50 Prestressing Concrete

4-5001 General

4-5001 General

Section 50, "Prestressing Concrete," of the *Standard Specifications* includes specifications for prestressing precast or cast-in-place concrete by tensioning prestressing steel. For detailed information regarding prestressed concrete, see Section 160, "Prestressed Concrete," of the *Bridge Construction Records and Procedures Manual* and the Office of Structure Construction's (OSC) *Prestress Manual.*

4-5002 Before Work Begins

4-5002 Before Work Begins

The contractor must submit for approval working drawings of the proposed prestressing system in accordance with Section 5-1.02, "Plans and Working Drawings," of the *Standard Specifications*. The working drawings are submitted directly to the Office of Structure Design, documents unit, as specified in Section 50, "Prestressing Concrete," of the *Standard Specifications*. The review of the working drawings is a coordinated effort between the Office of Structure Design and the OSC. The Office of Structure Design has the primary responsibility for approving the working drawings.

Before work begins, the resident engineer must take the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists prestressing materials.
- Review the OSC *Prestress Manual* for instructions on prestressing records to be kept during prestressing operations.

4-5003 During the Course of Work

4-5003 During the Course of Work

Prestressing operations are dangerous. The OSC *Prestressing Manual* contains safety information for prestressing operations. In addition, the OSC Code of Safe Practices, found on the OSC web site, contains safety guidelines to follow for prestressing operations. Before the contractor's operations begin, review both sources of information in a tailgate safety meeting.

After the completion of the work for each structure, the contractor must submit corrected working drawings to the resident engineer for transmittal to the Office of Structure Design, documents unit. Remind the contractor that final acceptance of the contract will not be made until the corrected working drawings have been submitted.

4-5004 Measurement and Payment

4-5004 Measurement and Payment

Payment for prestressing precast concrete members is included in the contract price for furnishing precast members. Prestressing cast-in-place concrete is paid for on the basis of a lump sum price. For guidelines for making monthly progress payments for prestressing cast-in-place concrete, see the Bridge Construction Memo 6-4.0, "Partial Payments," of the *Bridge Construction Records and Procedures Manual.*

Section 51 Concrete Structures

4-5101 General

4-5102 Before Work Begins

4-5103 During the Course of Work

4-5103A Placing Concrete
4-5103B Concrete Deposited Under Water
4-5103C Minor Structures
4-5103D Forms
4-5103E Joints and Bearings
4-5103F Drains in Walls
4-5103G Surface Finishing

4-5104 Measurement and Payment

Section 51 Concrete Structures

Section 51 Concrete Structures

4-5101 General

4-5101 General

This section covers items related to constructing concrete structures. Concrete structures include concrete bridges, grade separations, structure approach slabs, culverts, headwalls, endwalls, drainage inlets, retaining walls, and other concrete structures shown on the plans.

Many specified requirements for concrete structures apply only to bridges and major structures and are covered in detail in the *Bridge Construction Records and Procedures Manual*. Additional reference material can be found in the Office of Structure Construction's *Concrete Technology Manual*, *Foundation Manual*, *Prestress Manual*, and *Bridge Deck Construction Manual*.

The Office of Structure Construction is responsible for reviewing and approving falsework drawings and calculations. The Office of Structure Construction's *Falsework Manual* and the *Bridge Construction Records and Procedures Manual* contain detailed procedures. The Office of Structure Construction's project representative has complete responsibility and authority to approve falsework plans and enforce falsework specifications.

Section 3-705, "Public Safety," of the *Construction Manual* (manual) contains guidelines for work that temporarily impairs horizontal and vertical bridge clearance.

4-5102 Before Work Begins

4-5102 Before Work Begins

Before work begins, take the following steps:

- Review the plans and specifications. Determine the class or compressive strength of the concrete to be used. Review Section 4-90, "Portland Cement Concrete," of this manual, which covers the mix design review, approval, and production of concrete.
- Review and discuss with the contractor plans for placing concrete in each of a structure's parts. Before allowing the work to commence, discuss any obvious shortages of workers, equipment, or material that may prevent the completion of the structure's parts without interruption in the placing of concrete. Also discuss and evaluate project specific conditions for safely placing concrete, such as avoiding overhead lines.
- Determine what tests will be taken and the frequency and location of such testing, and assign the duties accordingly. For guidelines, see Chapter 6, "Sampling and Testing," of this manual.

4-5103 During the Course of Work

4-5103 During the Course of Work

Once work begins, take the steps listed for inspecting the following items:

- Placing of concrete
- Concrete deposited under water

- Minor structures
- Forms
- Joints and bearings
- Drains in walls
- Surface finishing

4-5103A Placing Concrete

During the placement of concrete, do the following:

- Check for any movement or deformation of forms that may exceed the specified tolerance. If the movement or deformation exceeds the specified tolerances, take appropriate action. This action may include halting concrete placement to install additional bracing or changing the rate or sequence of concrete placement to achieve the required lines and grade.
- Ensure the contractor follows the specified order of placing. Also, ensure that concrete for horizontal members or sections is not placed until the concrete in the supporting vertical members or sections has been consolidated and subsidence has occurred.
- Through observation, ensure that concrete is placed without causing segregation. Also, ensure that high frequency internal vibrators consolidate the concrete when specified. The method used to vibrate concrete directly affects the structure's strength. Ensure minimum contact between the vibrator and reinforcing steel. Concrete must be vibrated to the point where mortar and water flush to the surface; vibration beyond this point is not necessary or desirable. Insufficient vibration, on the other hand, will leave rock pockets(voids).
- Determining when subsidence has occurred will require judgment based on your experience with various concrete mixes. In general, subsidence has occurred when bleed water at the surface has disappeared.

4-5103B Concrete Deposited Under Water

Ensure the contractor meets all specifications related to Section 51-1.10, "Concrete Deposited Under Water," of the *Standard Specifications*. Unless otherwise provided for in the special provisions, only concrete designated as "seal course concrete" is to be placed under water.

4-5103C Minor Structures

Ensure that paving or surfacing has been completed immediately adjacent to a structure before the structure has been constructed to final grade.

4-5103D Forms

When using concrete forms, do the following:

- Ensure the forms are located properly. To detect any major discrepancy, include both spot-checking from the control stakes and also general observation independent of the stakes.
- For proper dimensions, measure inside the forms.
- Ensure forms are mortar tight.
- When specified, ensure the use of form oil.

- Ensure that all materials required to be embedded in concrete, such as reinforcement and miscellaneous metal, are in place and secured properly. For details, see Section 4-52, “Reinforcement,” and Section 4-75, “Miscellaneous Metal,” of this manual.
- Decide whether forms are sufficiently rigid to prevent undulations that exceed the specified values. If corrective measures are necessary, advise the contractor accordingly, and note the circumstances in the daily report.
- Check the forms for exposed surfaces to ensure the surfaces are faced with form panels as specified. Where required, ensure the use of triangular fillets.
- Ensure form bolts and fasteners are the types specified.
- Before placing concrete, ensure the removal from the forms of dirt, chips, sawdust, and other foreign materials. Also, ensure the contractor dewaters the forms and does any necessary pumping as specified and according to the contract’s environmental provisions.
- Before concrete placement, inform the contractor of any corrective action required. Note such action in the daily report.
- Ensure forms are removed in the specified manner. When forms are removed before the end of the specified curing period, require proper curing of the concrete.

4-5103E Joints and Bearings

For specific requirements for joints and bearings, review the contract plans and specifications. For bridges and major structures, also refer to the *Bridge Construction Records and Procedures Manual*.

Ensure that joints are constructed as specified. Also, verify they are constructed in a way that ensures they will function as intended. The following are some of the important items to check:

- Verify material has been inspected at the source and is properly identified for shipment. When required, ensure the material is sampled and tested in accordance with Chapter 6, “Sampling and Testing,” of this manual.
- When an open joint is required, ensure the reinforcement does not extend across the joint.
- Ensure sheet packing, preformed pads, or board fillers are held in place as specified.
- During concrete placement, check that expansion joint armor is placed and firmly held in position.
- Verify bearing devices are placed as specified and measure concrete bearing areas to ensure placement falls within specified tolerances.
- Before additional concrete placement, ensure horizontal construction joints are cleaned as specified. Also, ensure that expansion joint filler or bond-breaking compound is placed where required. Note such observations in the daily report.
- If an emergency makes a construction joint necessary, decide on the construction details of this joint and direct the contractor during its construction.
- Check the placement of any dowels to ensure the contractor cleans the holes before grouting and places the grout and dowels as specified.

- When mortar is used, ensure the contractor proportions it as required and places it as specified, including the curing requirements.
- Ensure waterstops are installed as specified and where shown on the plans. During concrete placement, make sufficient observations to ensure the waterstops are not materially shifted out of position or shape.

4-5103F Drains in Walls

Ensure that drain holes and weep holes are constructed as specified. Examine the excavation and consider other factors that could contribute to the buildup of hydrostatic pressure. When necessary, order additional drain holes or weep holes.

4-5103G Surface Finishing

Ensure the various concrete surfaces comply with the specifications. Ensure that the required finishing work is performed before structures are backfilled and that the appropriate finish is applied to all surfaces. For additional information, see Section 8-1.08, "Final Surface Finish," of the Office of Structure Construction's *Concrete Technology Manual*.

4-5104 Measurement and Payment

4-5104 Measurement and Payment

Take the following steps:

- In conformance with the dimensions shown on the plans, measure the quantity of concrete in structures by the cubic meter unless the quantities are designated as final pay quantities.
- Keep records of rejected concrete loads, and provide the reasons (preferably including test data) for such actions. Also keep records of any significant amounts of concrete placed outside of areas or limits for which payment is to be made.

Section 52 Reinforcement

Section 52
Reinforcement

4-5201 General

4-5201
General

Items used for reinforcement include bars, welded wire fabrics, and wires.

4-5202 Before Work Begins

4-5202
Before Work Begins

The Office of Materials Engineering and Testing Services (METS) is responsible for monitoring reinforcement materials at the source of supply. The fabricator will provide a Certificate of Compliance with shipments or reinforcement delivered to the job site.

Refer to the contract specifications and Section 3-605, "Certificates of Compliance," of the *Construction Manual* (manual) regarding Buy America requirements. Section 6-1.08 of the *Standard Specifications* covers the use of foreign materials.

During this preliminary inspection, also take the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists reinforcement materials.
- For each lot of material delivered to the project, require the contractor to conform to Section 6-1.07 of the *Standard Specifications* by providing Form TL-6046, "Fabricators Certificate of Compliance." Form TL-6046 can be obtained from METS.
- Inspect hook details to ensure they conform to specifications. Refer to the *Bridge Construction Records and Procedures Manual*, Volume II, Section 165, for hook details (which conform to the building code requirements of the American Concrete Institute). Also, examine the bars to detect damage from bending, for example, kinks or cracking of the steel on the surfaces of the hooks.
- Check the steel for general cleanliness, ensuring it does not have loose mill scale, excessive rust, or other deleterious coatings. Decide whether such coatings will destroy or reduce bonding, and if cleaning is necessary, advise the contractor.
- Check some of the ends of larger bars to detect any evidence of "piping." (Piping is a cavity in the core of a bar.) Also check for such rolling defects as scabs, seams, and laminations.
- As specified in Section 52-1.02B, "Epoxy-Coated Reinforcement," of the *Standard Specifications*, require repair or replacement of damaged epoxy-coated, bar reinforcing steel.
- The contractor may substitute welded wire fabric for reinforcing bars in certain concrete work shown in the *Standard Specifications*. The *Bridge Construction Records and Procedures Manual*, Volume II, Section 165, contains information that may be used to determine equivalent areas of the steel.

- Steel lists are required only if specifically requested by the engineer. It is Caltrans policy to not request such lists except for specific reasons, as described in Section 52-1.03, "Steel Lists," of the *Standard Specifications*.
- Steel lists are not to be requested for the convenience of assistant resident engineers in checking items such as sizes, dimensions, locations, clearances, and coverages. The contract plans and specifications serve this purpose.
- Before using butt welding to splice bar reinforcing steel, refer to your contract documents and the *Bridge Construction Records and Procedures Manual*, Volume II, Section 180.
- Before mechanically splicing bar reinforcing steel, refer to your contract documents and the *Bridge Construction Records and Procedures Manual*, Volume II, Section 165.

4-5203 During the Course of Work

4-5203 During the Course of Work

During the course of work, take the following steps:

- Examine the rolled-in grade marks to ensure the contractor is using the specified grade of reinforcing steel for the given structure. Refer to the *Bridge Construction Records and Procedures Manual*, Volume II, Section 165, for information about identifying marks on American-made bar reinforcing steel.
- Ensure the placing of the reinforcement in the forms conforms to the plans and specifications.
- Ensure that all reinforcement is securely wired at intersections and securely held in place and that bundle bars are tied at proper intervals. Also, ensure that the reinforcement is placed in the forms in a way that will not require the contractor to add or adjust bars during the placing of concrete.
- On cast-in-place, prestressed, post-tensioned structures, it may be necessary to adjust or relocate reinforcement to conform to the prestressing system the contractor selected. It may also be necessary to place additional steel. These details are shown on contractor drawings that the Caltrans reviews and approves. Use the approved prestressing details to ensure that, when placing concrete, the contractor provides the required clearances to various items, including the tendons and anchorages. In particular, ensure the proper placement of grillages at end anchorages.
- When the contractor uses mesh reinforcement, check that it is rolled flat and held firmly in place during placement of concrete or shotcrete.
- After the contractor places the reinforcement, ensure it is free of any coating (such as form oil, dust, or dirt) that would destroy or reduce bonding.
- To protect epoxy-coated reinforcing steel against sunlight, salt spray, and weather, ensure the contractor uses a secure covering. The contractor must repair any visible damage to the coating as specified in accordance with the manufacturer's recommended patching material.
- Vibrators used to consolidate concrete containing epoxy-coated reinforcing steel must have a resilient covering to prevent damage to the epoxy coating.

- Prefabricated epoxy-coated reinforcing steel (purple or gray in color) is cut to size and bent to shape before applying the coating. Prefabricated epoxy-coated rebars must not be bent or rebent after the coating.
- Postfabricated epoxy-coated reinforcement (green in color) is more flexible. It is applied to straight rebar, which is subsequently cut and bent to shape.
- Until the engineer approves the proper submittals, do not permit welding of any type on reinforcing steel. Refer to the *Bridge Construction Records and Procedures Manual*, Volume II, Section 180, for guidelines.
- Bar reinforcing steel is spliced by lapping bars, by butt welding bars, or by using mechanical couplers. Mesh reinforcement, reinforcing wire, or plain bars are generally spliced by lapping. Inspect all lapped splices to ensure the minimum lengths of lap and stagger distances conform to the plans and specifications. In particular, notice that the size of a bar and the grade of steel will determine the length of lap required. Ensure the laps are securely wired to maintain the alignment of the bars. Lap splices of mesh reinforcement must be tied securely with wire to prevent distortion of the mesh.
- All mechanical butt splices, butt welds, and lap welds on epoxy-coated reinforcing steel must be protected from corrosion with an approved mastic-lined shrink tube protective cover. You can find the METS list of approved coverings to protect against corrosion at:

  http://svhqsgi4.dot.ca.gov:80/hq/esc/approved_products_list/SpliceCover.html

  The mastic-lined shrink tubing must be used as specified in accordance with manufacturer and Caltrans requirements. Ensure the shrink tubing is installed as a continuous tube with sufficient diameter and length to achieve an adequate seal and bond length. The tubing must not have any dirt, grease, sharp edges, tears, or pinholes. After the tubing is heated as specified, ensure it extends a minimum of 50 mm onto the epoxy-coated reinforcing steel.

4-5204 Measurement and Payment

Refer to appropriate sections of the special provisions and *Standard Specifications* for the basis of measurement and payment. If payment is on a unit basis, you may need to keep records of reinforcement that is actually in place in the structure. Also, calculate any changes that result in increases or decreases in quantities of reinforcement.

4-5204 Measurement and Payment

Section 53 Shotcrete

Section 53
Shotcrete

4-5301 General

4-5301
General

Shotcrete is concrete pneumatically projected onto a surface. Shotcrete may be used for lining ditches and channels, paving slopes, and constructing warped sections. If allowed by the special provisions, shotcrete may also be used for structural applications.

4-5302 Before Work Begins

4-5302
Before Work Begins

Take the following actions:

- Review the contract to determine the areas and conditions in which shotcrete is to be used. Determine whether the contractor intends to use shotcrete as allowed by the special provisions or by Section 51-1.11, “Construction Methods,” Section 72-4.01, “Description,” or Section 72-6.01 “Description,” of the *Standard Specifications*.
- Verify the receipt and proper distribution of Form CEM-3101, “Notice of Materials to Be Used,” which lists shotcrete cement and aggregate.

4-5303 During the Course of Work

4-5303
During the Course of Work

The following instructions are for nonstructural and structural applications of shotcrete:

- Examine the foundation that will receive the shotcrete to ensure the foundation is evenly graded and free of high areas that would cause a thinner layer of shotcrete than required. Also, at the time the shotcrete is placed, ensure the foundation is firm and moist as specified. Note such observations in the daily report.
- Ensure the reinforcement is placed and firmly held in position as specified. Check joints, side forms, shooting strips, and where used, the position of ground or gauging wires.
- Obtain certificates of compliance and samples of portland cement and aggregate, and test them for all specified attributes. Ship the cement samples to the district materials unit for testing at the frequency shown in Section 6-1, “Sample Types and Frequencies,” of the *Construction Manual*. For testing aggregate, the district establishes the frequency, which can vary depending on the particular operation. Sufficient tests are to be run to ensure substantial compliance.
- Ensure the contractor proportions the specified amount of cement and aggregate.
- To support payment for the work, take measurements and keep records.
- Limit the placing of shotcrete to the specified lifts.
- Periodically check the working pressures of the equipment to ensure they meet specifications.

- Ensure the contractor uses clean reused rebound material in the specified amount.
- For placing dry-mix shotcrete, ensure the materials are used within 45 minutes of mixing the cement with the aggregate.
- For placing wet-mix shotcrete, ensure the materials are used within 90 minutes of mixing.
- Through observation, ensure a reasonably smooth and uniform finished surface for the type of work involved. Require low spots or depressions to be brought up to proper grade.
- Ensure the shotcrete is cured by one of the specified methods. When curing compound is used, ensure the specified application rate.
- Ensure the shotcrete is protected as specified.
- For structural applications the following are some of the more important duties of field personnel. For detailed procedures for using shotcrete, refer to the Office of Structure Construction's manual, *Shotcrete, a Field Guide for OSC Employees*.
- For locations where shotcrete can be used, refer to the contract's special provisions and plans.
- Only allow the use of a wet-mixed process if the specifications allow such use. For the "finish coat," the contractor may use a dry-mix process.
- Ensure the contractor abides by all the elements of the following prequalification process:
  1. Ensure the nozzleperson's experience conforms to the requirements for applying shotcrete in the intended location.
  2. Ensure the contractor sets up and shoots a preconstruction test panel that contains rebar and any other obstructions that are identical to the most heavily reinforced section to be shot.
  3. Ensure the contractor takes and tests the cores as necessary or required.
  4. After the time specified in the special provisions, demolish the preconstruction panel, and verify that a dense homogeneous mass completely encases the reinforcement.
- Ensure the proper mix is delivered by checking the delivery ticket of the first truck and by also checking the delivery tickets periodically throughout the day.
- Ensure that the nozzleperson and the blowpipe operator work together and that the nozzleperson does not get ahead of the blowpipe operator.
- Ensure the finishers rake away any loose material the blowpipe could not remove and they keep the surface at approximately a 45º angle.
- Watch vertical surfaces to ensure no slough off occurs because of mix that is too wet. Reference any areas that do slough off so they can be carefully sounded later. Any wet mix that does slough off should be removed and then reshot.
- The nozzleperson should make the extra effort to ensure complete encasement of the reinforcement. On double mats of reinforcement, this extra effort will require placing the nozzle through the front mat of the reinforcement and shooting from the sides of large bars to properly place the concrete behind the bars.

- To verify that shotcrete fully encases the reinforcement, occasionally rake out areas of congested reinforcement. Look for rock or sand pockets.
- Verify the shotcrete is homogeneous and the compressive strength adequate by taking random production cores from the completed work, as specified in the contract. To lay the cores out, follow the latest policies of the Office of Structure Construction.
- Verify that the surface finish matches the one demonstrated in the preconstruction panel.
- During the shotcrete application, ensure the contractor meets all the applicable safety standards and uses the proper safety equipment.
- Discuss with the structure representative or the area construction manager any proposal to use shotcrete at a location not indicated in the contract plans and special provisions.

4-5304 Measurement and Payment

4-5304 Measurement and Payment

Measure shotcrete by the cubic meter, computed from the actual area placed and the theoretical thickness shown in the plans. The special provisions may allow you to modify the measurement method.

Keep records of rejected shotcrete loads, and provide the reasons (preferably including test data) for such actions. Also, keep records of any significant amounts of concrete placed outside of pay limits.

Section 54 Waterproofing

Section 54 Waterproofing

4-5401 General

4-5401 General

Waterproofing consists of sealing concrete surfaces to prevent the passage of water. Dampproofing consists of treating concrete surfaces to retard the passage or absorption of water or water vapor. Section 54, "Waterproofing," of the *Standard Specifications*, provides for asphalt membrane waterproofing and dampproofing. Other types of waterproofing may be specified in the special provisions.

4-5402 Before Work Begins

4-5402 Before Work Begins

Before work starts, do the following:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers waterproofing materials.
- Upon delivery of the waterproofing materials, note whether they are identified by marks or inspection tags.
- You may accept waterproofing fabric on the basis of a Certificate of Compliance. For the fabric, complete Form CEM-4102, "Material Inspected and Released on Job."

4-5403 During the Course of Work

4-5403 During the Course of Work

During the work, do the following:

- Sample waterproofing materials in accordance with Section 6-1, "Sample Types and Frequencies," of the *Construction Manual*.
- Ensure the contractor prepares surfaces to be waterproofed or dampproofed as specified.
- For applying primer or asphalt, ensure weather conditions meet the specifications.
- Ensure the temperature of waterproofing asphalt is within the specified range.
- Inspect the operation to ensure the contractor applies asphalt membrane waterproofing and dampproofing as specified.

4-5404 Measurement and Payment

4-5404 Measurement and Payment

Field measure areas covered by asphalt membrane waterproofing and dampproofing.

Section 55 Steel Structures

Section 55
Steel Structures

4-5501 General

4-5501
General

Section 55, "Steel Structures," of the *Standard Specifications* includes specifications for constructing steel structures. For additional information regarding steel structures, see Section 170, "Structural Steel," and Section 180, "Welding," of the *Bridge Construction Records and Procedures Manual*.

4-5502 Before Work Begins

4-5502
Before Work Begins

The contractor must submit for approval working drawings for structural steel in accordance with Section 5-1.02, "Plans and Working Drawings," of the *Standard Specifications*. The working drawings are submitted directly to the Office of Structure Design, documents unit. The review of the working drawings is a coordinated effort between the Office of Structure Design, Office of Materials Engineering and Testing Services (METS), and the Office of Structure Construction. The Office of Structure Design has the primary responsibility for approving the working drawings.

If any welding must be performed, the contractor must submit a quality control plan for the work. For guidelines in approving the submittal, refer to Section 180, "Welding," of the *Bridge Construction Records and Procedures Manual*.

The resident engineer must also verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists structural steel materials.

4-5503 During the Course of Work

4-5503
During the Course of Work

During the work, take the following steps:

- Verify that METS has inspected and released structural steel and fastener assemblies by retrieving Form TL-0624, "Inspection Release Tag," as the assemblies are delivered to the site and by matching the assemblies to Form TL-0029, "Report of Inspection of Material."
- Ensure the contractor performs installation tension tests and rotational capacity tests on all lots of fastener assemblies just before their use. To keep track of the location of fastener assembly placement and to protect the assemblies from the weather, ensure the contractor stores the fastener assemblies in their original containers and out of the elements.
- Witness the contractor's verification of minimum tension as required by the specifications. Record the data in the project files.
- For guidelines for welded connections, refer to Section 180, "Welding," of the *Bridge Construction Records and Procedures Manual*.
- After the completion of the work for each structure, the contractor must submit corrected working drawings to the resident engineer for transmittal to the Office of Structure Design, documents unit. Remind the contractor that final acceptance of the contract will not made until the corrected drawings have been submitted.

4-5504 Measurement and Payment

4-5504 Measurement and Payment

Refer to the appropriate sections of the special provisions and *Standard Specifications* for the basis of measurement and payment.

Section 56 Signs

4-5601 General

4-5602 Before Work Begins

4-5603 During the Course of Work

4-5603A Overhead Sign Structures
4-5603B Roadside Signs

4-5604 Measurement and Payment

Section 56 Signs

Section 56
Signs

4-5601 General

4-5601
General

Signs and sign structures are of various types, from simple roadside signs to complicated sign bridges containing changeable message signs. The resident engineer must apply the correct inspection to ensure the contractor installs signs and sign structures to function properly.

4-5602 Before Work Begins

4-5602
Before Work Begins

Before work begins, take the following steps:

- Review the plans and specifications to determine the types of signs to be installed and any special requirements included in the contract.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers signs.
- If required, before the manufacturers furnish the materials, obtain from the Office of Materials Engineering and Testing Services (METS) an approval of foreign manufacturers. (Refer to Section 6-1.08, "Foreign Materials," of the *Standard Specifications*, which covers the use of foreign materials.)
- Refer to the contract specifications and Section 3-605, "Certificates of Compliance," of the *Construction Manual* (manual) regarding provisions of the Buy America requirements.
- Obtain working drawings, including, but not limited to, anchor bolt layouts, shop details, erection plans, and equipment lists for sign structures as required by the contract. With the assistance of the structure representative, review these working drawings and approve them if they comply with the contract. To review the working drawings of changeable message signs, refer to Section 168-3.1, "Shop Plan Review for Changeable Message Sign (CMS) Structures," of Volume II of the *Bridge Construction Records and Procedures Manual*. After review (and correction if necessary), return one set of the working drawings to the contractor with the following statement: "The plans are approved pursuant to Section 5-1.02 of the *Standard Specifications*."
- Do a field review of all sign locations, and check for possible conflicts with other structures, electrical and irrigation lines, and underground and overhead utilities. Ensure adequate horizontal and vertical sight distance. Trees or other landscape features may need to be trimmed to obtain adequate sight distance. Advise the contractor of any changes, and if necessary, prepare contract change orders. In addition, because relocating signs can impair or nullify their effectiveness, consult with the district traffic unit whenever changes must be made or the effectiveness of any signage is questionable.

- After control stakes have been placed, ensure the markings have the following:
  1. The correct span lengths
  2. The correct elevation of footing pedestals (usually 75 mm above the finished grade or the top of curbs)
  3. The minimum vertical clearance shown on the plans
  4. The required cover over the tops of footings
- To ensure incorporation into the work during shop fabrication, give the source inspector any changes that revise materials, specifications, or structural design. Normally, METS is notified of any changes through the receipt of a copy of the contract change order. However, allow sufficient lead time for the normal distribution of contract change orders. If changes are under way based on a "prior authorization," the resident engineer may need to send the revised specifications or drawings directly to METS in advance of the approved contract change order. Resident engineers should call METS to confirm receipt of the changes.
- Review the contract for any requirements for state-furnished material. Resident engineers must ensure that state-furnished sign materials have been ordered and will be ready for timely delivery. Make a physical inspection and inventory to confirm that all state-furnished sign materials are delivered in good condition. After delivery, the contractor is responsible for any damage to state-furnished materials.

4-5603 During the Course of Work

4-5603 During the Course of Work

Inspect both overhead sign structures and roadside signs.

4-5603A Overhead Sign Structures

Sign structures often involve many details that are critical to the structures' permanence. Although maintaining sign structures is expensive, attention to detail during construction can mitigate future problems.

The resident engineer has final responsibility for ensuring that signs and sign structures are constructed in accordance with the contract. The resident engineer also has final responsibility for making any changes that are necessary to serve the public as the designer intended. To perform the required duties properly, the resident engineer must obtain the relevant technical data. For overhead signs and bridge-mounted signs, copies of Section 168-1.0, "Bolted Connections for Overhead Sign Structures," and Section 170, "Structural Steel," of Volume II of the *Bridge Construction Records and Procedures Manual* will provide the information.

Construction inspectors should check the following items or perform the following duties:

- Upon delivery, check the materials' identification marks or inspection tags (using Form TL-0624, "Inspection Release Tag,") and match these marks and tags against those listed in Form TL-0029, "Report of Inspection of Material." (See Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of this manual for more explanation.) METS will check items for compliance with specifications. These items can also be checked at the source during fabrication. This check will include determining the adequacy of workmanship for activities such as welding, painting and galvanizing and also ensuring the

use of the proper materials. For portable changeable message signs, METS will also ensure that all control components are connected and operating properly before release to the job site.

- Require the repair of any minor damage to galvanizing or coatings, as specified in Section 75-1.05, "Galvanizing," of the *Standard Specifications*.
- Determine that METS has inspected and approved anchorage devices for bridge-mounted signs. Ensure that anchorage devices are installed as recommended by the manufacturer, as shown on the plans, and as specified. For more information on anchorage devices, refer to Section 135, "Miscellaneous Construction Materials," Volume II of the *Bridge Construction Records and Procedures Manual*.
- Ensure the proper type of bolts in field connections. Observe the installation of high-strength bolts to ensure the correct method and sequence for tightening. Refer to Section 170, "Structural Steel," Volume II of the *Bridge Construction Records and Procedures Manual* for the specifications of the American Society for Testing and Materials for high-strength bolts.
- METS inspects welding at the fabrication plant. If welding will be performed at the job site, contact METS for assistance. Also, at the job site, visually check for any obvious defects. During sign erection, ensure a proper fit between the post and the sign frame. Also, verify the provision of the proper minimum clearances.
- Ensure that the surface finishes of all metal parts of sign structures meet specifications. Inspect portions of the work completed in the field.
- Ensure through observation that sign panels and fastening hardware comply with specifications. Ensure that exposed portions of fastening hardware on the panel faces have been finished as specified.
- Ensure that the construction of footing pedestals complies with specifications. It is particularly critical that the contractor correctly position and align anchor bolts for sign bridges.
- To ensure the minimum horizontal and vertical clearances, verify that the location and elevation of the footing pedestals are correct.
- Ensure the contractor performs electrical work according to the specifications.
- Ensure the contractor performs field painting, including touch-up, according to the specifications.
- Examine sign panels for compliance with specified workmanship.
- Whenever an installation exceeds the scope of knowledge of available personnel, request assistance from, or consult with, other units. For instance, you may call upon mechanical and electrical engineers from the Office of Structure Design for assistance with changeable message signs.
- Ensure sign panels over lanes and lane arrows are correctly centered over the appropriate lanes.

- Report any temporary or permanent changes to horizontal and vertical clearances to the Transportation Permits Branch in accordance with Section 3-705A, "Clearance and Bridge Permit Rating Changes (Temporary)," of the *manual.*
- Ensure adherence to the public safety requirements of the special provisions regarding permanent obstacles that are temporarily unprotected.

4-5603B Roadside Signs

Do the following for these types of signs:

- Upon delivery, check the materials' identification marks or inspection tags (using Form TL-0624, "Inspection Release Tag") and match these marks and tags against those listed in Form TL-0029, "Report of Inspection of Material." (See Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of this manual for more explanation.) METS will check items for compliance with specifications. These items can also be checked at the source during fabrication. Note the type of preservative used to treat wood posts.
- Ensure postholes are located so that the signs will have the correct horizontal clearance and will not be obstructed by other objects. Also, verify that holes are excavated to the full depth and backfilled as specified.
- Ensure the provision of minimum vertical clearances to the bottom of the sign panels, as required by the specifications.
- If posts are cut or drilled in the field, ensure the contractor treats exposed areas as specified.
- Ensure that the attaching of signs to posts complies with requirements.
- You may request the assistance of the district traffic unit. Such assistance may include an actual in-the-field review of sign staking and also day and night observation of completed signage. Include in the daily report notes on assistance received and changes made.

4-5604 Measurement and Payment

4-5604 Measurement and Payment

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

Section 57 Timber Structures

Section 57
Timber Structures

4-5701 General

4-5701
General

Section 57, "Timber Structures," of the *Standard Specifications*, includes specifications for constructing timber structures in conformance with the plans and specifications.

4-5702 Before Work Begins

4-5702
Before Work Begins

Before work begins, take the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists timber materials.
- Occasionally, lead times can be longer than a contractor anticipates to procure hardware and timber requiring preservative treatment. Early in the project, determine when materials will arrive at the job site.
- If the timber structure requires painting, review Section 4-59, "Painting," and Section 4-91, "Paint," of the *Construction Manual* (manual).
- If the work requires treated materials, review Section 4-58, "Preservative Treatment of Lumber, Timber, and Piling," of this manual.

4-5703 During the Course of Work

4-5703
During the Course of Work

During the work, take the following steps:

- To verify that the Office of Materials Engineering and Testing Services has inspected and released the materials to be used, retrieve Form TL-0624, "Inspection Release Tag," as the materials are delivered to the site, and match the materials to Form TL-0029, "Report of Inspection of Material."
- In accordance with Table 6-2.1, "Inspection of Fabricated and Manufactured Materials," of this manual, visually inspect the timber.
- Ensure the timber and hardware conform to the plans and specifications.

4-5704 Measurement and Payment

4-5704
Measurement and Payment

For the basis of measurement and payment, refer to appropriate sections of the special provisions and *Standard Specifications*.

Section 58 Preservative Treatment of Lumber, Timber, and Piling

Section 58 Preservative Treatment of Lumber, Timber, and Piling

4-5801 General

4-5801 General

The work covered in this section consists of treating wood products to prevent decay from moisture, bacteria, or insects. Piling, poles, posts, and lumber requiring preservative treatment are specified in the *Standard Specifications* in the following sections:

- Section 49, “Piling”
- Section 56, “Signs”
- Section 57, “Timber Structures”
- Section 80, “Fences”
- Section 83, “Railings and Barriers”
- Section 86, “Signals, Lighting and Electrical Systems”

4-5802 Before Work Begins

4-5802 Before Work Begins

Before work starts, do the following:

- Verify the receipt and proper distribution of Form CEM-3101, “Notice of Materials to Be Used,” for wood products requiring preservative treatment.
- Upon delivery of the materials, note whether they are identified by marks or inspection tags. Inspection and release of treated wood products by the Office of Materials Engineering and Testing Services will ensure that specified preservative treatment meets specifications.
- Inspect the material in accordance with the Table 6-2.1, “Inspection of Fabricated and Manufactured Materials,” in Section 6-2, “Acceptance of Manufactured Material and Sampling Methods,” of the *Construction Manual*.

4-5803 During the Course of Work

4-5803 During the Course of Work

You do not need to further inspect preservative treatment other than ensuring that any damage during handling and installation does not reduce the treatment’s effectiveness.

4-5804 Measurement and Payment

4-5804 Measurement and Payment

The payment for preservative treatment is included in the contract prices paid for the various wood products that are treated.

Section 59 Painting

Section 59
Painting

4-5901 General

4-5901
General

Section 59, "Painting," of the *Standard Specifications* includes specifications for painting. For additional information regarding painting steel structures, see Section 155, "Paint," of the *Bridge Construction Records and Procedures Manual.*

4-5902 Before Work Begins

4-5902
Before Work Begins

Review Section 4-91, "Paint," and Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of the *Construction Manual.*

4-5903 During the Course of Work

4-5903
During the Course of Work

During the work, take the following steps:

- To verify the Office of Materials Engineering and Testing Services has inspected and released the paint to be used, retrieve Form TL-0624, "Inspection Release Tag," as the paint is delivered to the site and match the paint to Form TL-0029, "Report of Inspection of Material."
- Ensure that surfaces have been prepared as the specifications require. If blast cleaning is required for structural steel, ensure the contractor obtains the surface profiles as the special provisions require.
- During painting, ensure the correct weather conditions exist, and during drying, ensure conditions will remain favorable.
- For structural steel, ensure that each application of paint and each coat of paint are of the proper thickness. Frequently check difficult to reach areas for coverage.

4-5904 Measurement and Payment

4-5904
Measurement and Payment

For the basis of measurement and payment, refer to the appropriate sections of the special provisions and *Standard Specifications.*

Section 61 Culvert and Drainage Pipe Joints

Section 61 Culvert and Drainage Pipe Joints

4-6101 General

4-6101 General

Section 61, "Culvert and Drainage Pipe Joints," of the *Standard Specifications* provides an opportunity for the contractor to choose alternate types of joint systems or couplers used with culvert and drainage pipe that are specified in the following sections of the *Standard Specifications*:

- Section 64, "Plastic Pipe"
- Section 65, "Reinforced Concrete Pipe"
- Section 66, "Corrugated Metal Pipe"
- Section 69, "Overside Drains"

When joint systems and couplers conforming to the provisions in Section 61 are selected, the contractor must provide test results or a mathematical analysis of the joint materials.

4-6102 Before Work Begins

4-6102 Before Work Begins

Before work starts, do the following:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers all pipe joint materials.
- Upon delivery of the materials for pipe joints and couplers, note whether the materials are identified by marks or inspection tags.
- Ensure that the Office of Materials Engineering and Testing Services (METS) has inspected and released the pipe joint and coupling material.
- If the contractor has chosen to supply material specified in Section 61, "Culvert and Drainage Pipe Joints," of the *Standard Specifications,* and the material has been released, METS will have received all paperwork including certificates of compliance, test results, and mathematical analysis.

4-6103 During the Course of Work

4-6103 During the Course of Work

Various sections of the *Construction Manual* describe the procedures for inspecting the types of culvert and drainage pipe affected by this section. Ensure that the correct types of joints or couplers are used and any required testing for watertightness is performed as specified.

4-6104 Measurement and Payment

4-6104 Measurement and Payment

The payment for pipe joints and couplers is normally included in the contract prices paid for the various types and sizes of culvert and drainage pipe.

Section 62 Alternative Culverts

Section 62 Alternative Culverts

4-6201 General

4-6201 General

Section 62, "Alternative Culverts," of the *Standard Specifications* provides the contractor the opportunity to choose between several different kinds of culverts to be installed or constructed. Alternative culverts may include pipe, pipe arch, reinforced concrete box, and reinforced concrete arch culverts. The contract plans show the locations and alternative types of culverts. When alternative culverts are specified, the engineer's estimate will designate contract items as alternative culverts for each size and type of culvert.

4-6202 Before Work Begins

4-6202 Before Work Begins

Before work starts, do the following:

- Review the special provisions and contract plans to determine the different types of culvert that may be used and the locations where alternative culverts may be installed.
- Ensure that Form CEM-3101, "Notice of Materials to Be Used," lists the type of pipe, pipe arch, or reinforced concrete box or arch the contractor chose for alternative culverts.

4-6203 During the Course of Work

4-6203 During the Course of Work

For guidelines for inspecting each chosen type of culvert, refer to the appropriate section in Chapter 4, "Construction Details," of the *Construction Manual* (manual).

4-6204 Measurement and Payment

4-6204 Measurement and Payment

Once a type of culvert has been selected, apply the specifications for pipe and pipe arches, including measurement and payment provisions, specific to that type of culvert. To measure the various types of pipe selected, follow the guidelines in this manual. For reinforced concrete box and arch culverts paid for as alternative culvert, Section 62, "Alternative Culverts," of the *Standard Specifications* specifies the measurement method.

Section 63 Cast-In-Place Concrete Pipe

Section 63 Cast-In-Place Concrete Pipe

4-6301 General

4-6301 General

Cast-in-place concrete pipe is used for culverts operating under low head conditions and is generally not placed under a roadbed. For the design criteria for this type of pipe, see Topic 854 of the *Highway Design Manual*. Also, note that special soil conditions are necessary for installing cast-in-place concrete pipe.

4-6302 Before Work Begins

4-6302 Before Work Begins

Before work begins, the resident engineers and the assistant resident engineers should review the plans, specifications, and the "Materials Information," and inspect the sites of all planned installations. During the preliminary review and inspections, the resident engineers and assistants should also do the following:

- If any existing conditions preclude successful installation of the pipe, make any necessary contract changes by contract change order.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials To Be Used," which would cover portland cement concrete.
- Arrange for preliminary testing and mix design. (Refer to Section 90 of the *Standard Specifications* and to Section 4-90, "Portland Cement Concrete," of the *Construction Manual* (manual) for information on the production of portland cement concrete.)
- Examine the proposed equipment for making the pipe.

4-6303 During the Course of Work

4-6303 During the Course of Work

During work operations, the resident engineers and assistant resident engineers should do the following:

- Ensure that the pipe will be placed to the planned flow line grade by spot checking elevations using control stakes set by Caltrans.
- Determine that the bottom of the trench, as shown on the plans, is shaped to the pipe's external diameter.
- Require that the surface, against which the concrete will be placed, is moist but free of standing water, mud, and debris.
- Order the discontinuance or alteration of any equipment or method that doesn't produce the desired result.
- Check the penetration of the concrete. Make enough sets of concrete cylinders to ensure the minimum required strength prior to placing backfill material.

- Inspect freshly placed concrete for consolidation. Rock pockets indicate inadequately consolidated concrete. Sight along the pipe's flow line to ensure no irregularities exist outside the specified tolerance. Make measurements to check required thickness. Make a rough check of thickness by comparing the volume of concrete placed with the theoretical volume of the pipe in place. Ensure construction joints meet specifications.
- Inspect the pipe periodically throughout the progress of work and order any necessary repairs.
- Require that the pipe is cured, backfilled, and protected as specified.
- Before recommending contract acceptance or relief of maintenance, require the pipe to be cleaned if necessary.

4-6304 Measurement and Payment

4-6304 Measurement and Payment

Determine the quantity of pipe by using the slope length shown on the plans or calculated from staking notes or information on the plans, plus or minus any ordered changes. Quantity calculations should reflect this method of measurement. Also, to ensure the proper payment, review the payment clause in the specifications.

Section 64 Plastic Pipe

Section 64
Plastic Pipe

4-6401 General

4-6401
General

Plastic pipe is used for culverts and storm drains. Plastic pipe consists of either polyethelene or polyvinyl chloride pipe (PVC).

4-6402 Before Work Begins

4-6402
Before Work Begins

Well before work begins, review the plans and specifications and inspect the sites of all planned installations. Reviewing these items sufficiently in advance helps prevent scheduling conflicts and errors in ordering materials.

During the preliminary review and inspections, the resident engineers and assistant resident engineers should also do the following:

- Identify any unsolved drainage problems.
- Make any plan changes necessary to fit field conditions.
- Determine the locations and lengths of the pipes.
- Once the previous step is accomplished, if necessary, give the contractor a revised pipe list. The list should include any pipes added or altered by a contract change order.
- Verify that Form CEM-3101, “Notice of Materials To Be Used,” which would cover plastic pipe, has been received and properly distributed.

4-6403 During the Course of Work

4-6403
During the Course of Work

During work operations, the resident engineers and assistant resident engineers should do the following:

- Ensure the contractor constructs embankments as specified before any structure excavation.
- Before pipe installation, ensure that excavations and any required bedding are as shown in the *Standard Plans* and meet the specifications.
- After the pipe arrives at the job site, check identification tags or marks to ensure an inspector from the Office of Materials Engineering and Test Services (METS) has inspected the pipe at the source of the pipe’s origin.

- Verify the final acceptability of the pipes following the guidelines in Section 6-2, "Acceptance of Material and Sampling Methods," of the *Construction Manual* (manual). The following problems with pipe are unacceptable:

Type of Pipe	Unacceptable Problems
High density polyethelene	Cracks in ribs or inner wall
Polyvinyl chloride pipe (PVC)	Cracks in wall or cracked or missing ribs

- During the onsite storage of PVC pipes, verify their protection from long-term exposure to sunlight. Without such protection, the pipes may become brittle. In fact, ensure that pipes are protected from any kind of damage throughout all operations.
- Verify that pipes of the specified size, type, and class are in the proper locations.
- Examine gaskets for cracks or splits.
- Verify pipe joints are installed as specified.
- Require methods of handling that will not damage the pipes.
- Ensure that backfill work complies with the details on the contract plans, *Standard Plans*, or both. Refer to Section 4-19, "Earthwork," of this manual for additional instructions on excavation and backfill.
- After the backfill of pressure pipes or siphons to 0.6 m over the crown, witness the specified hydrostatic tests. Require the repair of all obvious leaks and leak reductions to the maximum permitted.
- Require that culvert construction loads (as shown in the *Standard Plans*) meet the minimum fill conditions.
- Continue to periodically inspect pipes as work progresses. A critical time to inspect is after the completion of the grading and before the start of base and surfacing. During the final phases of the project, make another inspection, primarily to find any pipes that need cleaning.

4-6404 Measurement and Payment

4-6404 Measurement and Payment

See Section 4-65, "Reinforced Concrete Pipe," of this manual for a discussion on measuring pipe.

Section 65 Reinforced Concrete Pipe

Section 65 Reinforced Concrete Pipe

4-6501 General

4-6501 General

Reinforced concrete pipe is used for culverts, siphons, drains, and conduits. Section 65, "Reinforced Concrete Pipe," of the *Standard Specifications*, includes specifications for circular reinforced concrete pipe, oval-shaped reinforced concrete pipe, and reinforced concrete pipe arch. The resident engineer and assistant resident engineers responsible for inspecting reinforced concrete pipe need to be familiar with the specifications and *Standard Plans* that provide for determining the physical characteristics of the pipe. The specifications provide options to the contractor for selecting the class of pipe and earthwork required for installing the pipe. The Office of Materials Engineering and Testing Services (METS) personnel will test and inspect the pipe during manufacturing, but the resident engineer and assistant resident engineers must ensure that the correct combination of class of pipe and earthwork methods are used in each location.

4-6502 Before Work Begins

4-6502 Before Work Begins

Well before work begins, review the plans and specifications and inspect the sites of all planned installations. Reviewing these items sufficiently in advance helps prevent scheduling conflicts and errors in ordering materials. During the preliminary review and inspections, the resident engineers and assistant resident engineers should also do the following:

- Review the "Materials Information" from METS and ensure that the special provisions cover any special requirements.
- Note any unsolved drainage problems, and make any necessary changes by contract change order.
- As soon as final locations and lengths are determined, give the contractor a revised pipe list, including those pipes added or altered by contract change order.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials To Be Used," which would cover reinforced concrete pipe of the type and class specified. Note that use of direct design method circular reinforced concrete pipe or nonreinforced pipe is permitted under those conditions enumerated in the specifications.

4-6503 During the Course of Work

4-6503 During the Course of Work

During work operations, the resident engineer and assistant resident engineers should do the following:

- Once the pipe arrives at the job site, check the identification tags or marks to ensure a METS inspector has inspected the pipe at the source of origin.

- Determine the final acceptability of the pipe using the guidelines in Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of this *Construction Manual* (manual). Sections of pipe that have met the requirements of the three-edge bearing test may be used in the work. Cracks resulting from the three-edge bearing test are not a reason for rejecting the pipe.) Small numbers of hairline cracks and minor chips are not so serious as to require rejecting pipe, either. However, the following problems are not acceptable: pipe with cracks through the wall, exposed reinforcing steel, or damaged bells, spigots, or joint grooves.
- For culverts that have been installed and backfilled, cracks should not exceed 0.3 mm in width in severely corrosive environments (that is, environments consisting of a pH of 5.5 or less, seawater, or water containing vegetal or animal wastes or chloride concentration greater than 500 ppm). Conversely, for culverts installed in a noncorrosive environment (that is, environments consisting of a pH greater than 5.5, water containing animal or vegetal wastes or chlorides concentration less than 500 ppm.), cracks of up to 3.0 mm in width in the installed pipe are acceptable if they are not excessive in number. Note the requirements in the specifications for marking pipe. Ensure that pipe of the specified size, type, and class is installed at the proper locations.
- Before structure excavation, require that embankments be constructed as specified. Before installing pipe, determine the acceptability of excavations and any required bedding, as described in the specifications and as shown in the *Standard Plans*. Excavation must occur for each bell to avoid shear cracking.
- Require methods of handling that will not damage the pipe.
- At the contractor's option and expense, the contractor can use extra strong pipe to withstand the pressures of jacking. Ensure any voids resulting from jacking are filled.
- Elliptically reinforced pipe must be placed so the minor axis is vertical. Note the locations of indicators, painted stripes, or lift holes to ensure proper placement. Before the contractor places the backfill, ensure lift holes are plugged.
- Ensure pipes are placed with belled ends upstream. Where possible, pipes should be laid on the upgrade. Progress on the upgrade facilitates tight joints, particularly for pipes on steep grades. However, extending existing pipes downstream will require laying pipe on the downgrade or will require a special connecting structure.
- Joints must have smooth, uniform interior surfaces. Unless otherwise required, joints must be sealed completely with mortar, rubber gaskets, resilient materials, or liquid sealing materials. Reject gaskets that have cracks or splits.
- Check the aggregate and the proportioning of portland cement mortar. The mortar must be used within 30 minutes after the addition of water. Permit the use of admixtures to improve workability, and determine the amounts to be added.
- Ensure rubber gaskets are stored in a cool place away from sunlight. If lubrication is required before installation, require the contractor to follow the manufacturer's instructions.
- Ensure resilient materials are tested before use. During sealing with liquid materials, ensure molds or runners retain the liquid materials. Liquid sealers must be placed continuously and agitated until the joint is completely filled.

- Review backfill details on the contract plans, *Standard Plans*, or both. Determine that the class of reinforced concrete pipeand method of backfill selected by the contractor meet these details. Refer to Section 4-19, “Earthwork,” of this manual for additional instructions on excavation and backfill.
- Backfill may be done while the mortar in joints is plastic. However, after the mortar sets, do not permit backfill until 16 hours after sealing. Further, because free water may not contact the pipeline until seals containing portland cement have aged 24 hours, no backfill may be placed during this period if it must be watered in place. Require backfilling in a manner that will not damage seals, whether by direct impact or through displacement of joints. Imported structure backfill should be checked for pH and resistivity levels to verify that the service life of the pipe will not decrease. The limits of concrete backfill, when required, will be shown on the plans. Concrete backfill is paid for as a separate item. The contractor may use slurry cement backfill for backfilling culverts. When either concrete backfill or slurry cement backfill are used, observe carefully and ensure the pipe is not displaced or floated by uneven or too rapid placement. For fast-setting concrete or fast-setting slurry cement backfill, allow only nonchloride admixtures to accelerate the setting time.
- After the backfill of pressure pipes or siphons to 0.6 m over the crown, witness the specified hydrostatic tests. Require the repair of all obvious leaks and leak reductions to the maximum permitted.
- Require that minimum cover for construction loads, as shown in the *Standard Plans*, be placed over reinforced concrete pipe culverts.
- Insist that pipes be protected from damage during continuing operations. Periodically inspect pipes as work progresses. A particularly critical time to inspect comes after the completion of the grading plane and before the start of base and surfacing. During the final phases of the project, make another inspection, primarily to find any pipes that need cleaning.

4-6504 Measurement and Payment

The length of pipe to be paid for is the slope length designated by the engineer. This slope length is the length shown on the plans, plus or minus any changes the engineer makes, or the length as determined from the surveyors’ staking notes. If pipe is cut to fit a structure or a slope, the pay length is the length necessary to be placed before cutting, rounded up to the nearest one-meter increment. If the contractor forms the pipe out from a structure, the formed distance is also part of the length of the pipe necessary before cutting. If the pipe joins a structure at a skew, the length of pipe necessary to be placed before cutting is the longer side of the pipe. Pipe bends, wyes, tees, and other branches must be field measured in accordance with the specifications.The following are examples for measuring culvert pipe when the length to be paid for is the slope length designated by the engineer.

4-6504 Measurement and Payment

4-6504A Case I

PIPE PLACEMENT	CUT OR UNCUT PIPE	PAYMENT METHOD
Pipe between two structures (inside face to inside face of two drop inlets).	Cut	Pay to the one-meter increment equal to or longer than the pipe necessary before cutting

Example 1:

The length along centerline between the two faces and additional length required due to skew=18.9 m

Individual lengths of pipe placed total 18.3 m, plus additional length made up in joints and by forming out from one structure.

Pipe is cut due to skew at the other structure.

Therefore:

Pay for 19 m

Example 2:

Centerline length between inside faces not on a skew=18.5 m

Lengths of pipe placed total 19.5 m

Therefore:

Pay for 19 m

4-6504B Case II

PIPE PLACEMENT	CUT OR UNCUT PIPE	PAYMENT METHOD
Pipe between two structures.	Uncut	Pay the designated length.

Example:

- Slope length along centerline of the pipe between the two inside faces=44.4 m.
- Individual lengths of pipe placed total 44 m, plus additional length made up in joints or forming out from one structure, or both.

Therefore:

Pay for 44.4 m

4-6504C Case III

PIPE PLACEMENT	CUT OR UNCUT PIPE	PAYMENT METHOD
Pipe placed from toe of fill to toe of fill.	Uncut	Pay the slope length the engineer designates.

Example:

- Designated length=44 m.
- Laid pipe=44.4 m, with the additional length due to the gain in joints. One end is allowed to extend the additional distance beyond the toe of fill.

Therefore:

Pay for 44 m

Under the following circumstances, you may use field measurements in lieu of calculations or you may supplement calculations:

1. A culvert runs between two structures. After verifying that the structures are constructed as shown on the plans, you can determine designated length from a field measurement along the centerline of the pipe between the two inside faces. If the pipe is cut, make appropriate adjustments to the field measurement.
2. After verifying that a culvert is properly staked, you may use field measurements between stakes referenced to the ends of the culvert to determine the length designated by the engineer. If you use a field measurement to determine pay lengths, include on the quantity sheet an explanation of how the field measurement relates to the length designated by the engineer.

Section 66 Corrugated Metal Pipe

Section 66 Corrugated Metal Pipe

4-6601 General

4-6601 General

Corrugated metal pipe, designated by metal thickness and pipe diameter, includes both steel and aluminum pipe. The *Standard Plans* specify the requirements and other details for coupling bands.

4-6602 Before Work Begins

4-6602 Before Work Begins

The resident engineer should take the following preliminary steps:

- Review plans and specifications.
- Inspect the job site for the locations of all proposed installations.
- Modify plans when necessary to fit field conditions. Prepare contract change orders for major changes from approved plans, for example, additions, deletions, or changes in type or size of pipe. When structures are staked, adjustments may be made in location or length of cross drains or side drains, as necessary without requiring a contract change order.
- After determining final locations and lengths, give the contractor a revised pipe list, including those pipes added or altered by contract change order.
- Verify the receipt and proper distribution of Form CEM-3101, “Notice of Materials to Be Used,” which lists all fabricated materials.

4-6603 During the Course of Work

4-6603 During the Course of Work

During the work, do the following:

- Upon delivery of the pipe, note whether it is identified by marks or inspection tags. (Form TL-0624, “Inspection Release Tag.”) Check the pipe for any possible damage sustained after inspection at the source. Require the repair of minor damage to coatings or galvanizing. If satisfactory repair cannot be achieved, require the contractor to remove this unacceptable pipe from the project. If the pipe is properly identified as inspected, project personnel normally do not need certificates of compliance or mill test reports. An inspector from the Office of Materials Engineering and Testing Services (METS) will have already obtained these documents.
- Before excavating pipe, require that embankments be constructed as specified. Refer to Sheet A-62F of the *Standard Plans* for excavation and backfill requirements.
- For instructions about inspecting backfill, see Section 4-19, “Earthwork,” of the *Construction Manual* (manual). Corrugated metal pipe can be displaced or damaged during backfill. Therefore, insist on precautions to prevent damage.

- For information about concrete backfill and slurry cement backfill, see Section 4-65, “Reinforced Concrete Pipe,” of this manual. The contractor must not use slurry cement backfill with aluminum metal pipe or corrugated metal pipe coated with aluminum.
- Be particularly alert to ensure the required type and thickness of pipe at each location. To avoid galvanic corrosion, prohibit the combination of steel and aluminum in any installation.
- Note whether the ends of pipe have been reinforced where required. Where pipe terminates at a structure, require the end of the pipe to be flush with the face or interior surface.
- Ensure circumferential joints and side seams are positioned as required. Especially note whether spaces between lengths of pipe permit a correct fit by couplers. For helically corrugated pipe, corrugations must be matched across field joints with proper space maintained between lengths of pipe. Angles, lugs, or other projections on couplers must be positioned about halfway between the crown and the side of the pipe. Before permitting backfill, couplers must be snug and tight.
- Before joint materials for culvert and drainage pipe arrive at the site, a METS inspector will inspect and test the material as necessary.
- When siphons or watertight joints are installed, witness the required hydrostatic tests.
- When pipes are installed by jacking, note whether methods and equipment damage the pipe. Heavier pipe may be necessary to withstand jacking pressure. The contractor must bear any extra cost that exceeds the cost for the original pipe of specified thickness.
- During and after jacking, ensure that both line and grade comply with specified tolerances. If the void between the pipe and the periphery of the excavation exceeds the permitted amount, require the contractor to fill the void with sand or mortar. This filling may be accomplished by using special fittings placed through the pipe wall or by using holes drilled from the surface to the void.
- As shown on Sheet D88 in the *Standard Plans*, ensure minimum fill conditions are met for construction loads on culverts.
- Throughout the progress of the work, inspect installed pipes periodically. If you discover any structural deficiencies, ensure the deficiencies are corrected before the start of the base or surfacing operations, where pipes underlie pavements. Before accepting the contract, or recommending a granting of relief from maintenance, all pipes must be inspected and, if necessary, cleaned. The contractor is responsible for cleaning pipes placed under contract.

4-6604 Measurement and Payment

4-6604 Measurement and Payment

See Section 4-65, “Reinforced Concrete Pipe,” of this manual for information on measuring pipe.

Section 67 Structural Metal Plate Pipe

Section 67 Structural Metal Plate Pipe

4-6701 General

4-6701 General

Structural metal plate pipe includes steel and aluminum pipes, arches, and pipe arches and is assembled in the field. The plans and specifications designate the number and thickness of plates in each installation.

4-6702 Before Work Begins

4-6702 Before Work Begins

Before work begins, take the following steps:

- Sufficiently in advance of the contractor's start of operations to prevent conflicts in scheduling or errors in ordering materials, review the contract plans, *Standard Plans* (sheets A62F, D88A, and B14-1, as appropriate), and specifications. Inspect the site of each planned installation. Note any unsolved drainage problems.
- As soon as final locations and lengths are determined, furnish the contractor a revised pipe list.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists all fabricated materials.
- Before assembling the structural plates, ensure the receipt of the manufacturer's assembly instructions. Ensure the instructions conform to the plans and specifications.

4-6703 During the Course of Work

4-6703 During the Course of Work

Once work begins, do the following:

- Upon delivery, determine whether Form TL-0624, "Inspection Tags," identifies the pipe.
- Also, upon delivery, note the condition of the pipe. Require the repair of minor damage to galvanizing or bituminous coatings. Prohibit the repair of serious damage, such as buckled, bent, cracked, or torn plates. Reject plates with damage of this extent.
- Double-check to ensure the proper type, size, and strength of pipe at each location.
- If mastic for protective coating will be field applied, ensure an inspector from the Office of Materials Engineering and Testing Services (METS) has inspected the material.
- Normally, the METS inspector will have obtained the certificates of compliance or mill test reports. If materials are properly identified as previously inspected, project personnel do not need these documents.
- Before structure excavation, require that embankments be constructed as specified. Note the requirement on the plans for shaped bedding.

- Require assembly according to the manufacturer's instructions. The following items must comply with instructions and specifications:
  1. Sequence of placing plates
  2. Longitudinal and circumferential joints and laps
  3. Types and sizes of bolts and nuts to be used
  4. Manner of bolt placement
  5. Number of bolts to be placed before tightening
  6. Bolt-tightening sequence and torques
  7. Type of end treatment
- Check maximum as well as minimum torque to ensure they comply with the requirements in Section 67-1.05, "Placing," of the *Standard Specifications*. During the checking of torque, insist on an adequate working platform and safety devices to prevent injury in case of the shearing of a bolt or the breaking or slipping of a torque wrench.
- Refer to the *Standard Plans* for the design of required strutting and for the minimum cover for construction loads. Require that minimum fill conditions, as shown on the plans, be met for construction loads on culverts.
- When bituminous coating is required, determine that all bolts on the outside of the pipe are coated with mastic before backfill. When coating is field applied, require the sealing of all joints before backfill.
- Prohibit the use of slurry cement backfill with aluminum structural metal plate pipe. Refer to Section 4-19, "Earthwork," of the *Construction Manual* (manual) for instructions on inspecting backfill. Refer to Section 4-65, "Reinforced Concrete Pipe," of the manual regarding slurry cement backfill.
- Throughout the progress of the work, periodically inspect installed pipes and arches. If you discover any structural deficiencies, ensure these are corrected before the start of base or surfacing, where pipes or arches underlie pavements.
- Before you recommend acceptance of the contract or make a recommendation to grant relief from maintenance, require the contractor to clean all pipes and arches if necessary.

4-6704 Measurement and Payment

4-6704 Measurement and Payment

See the discussion of measurement of pipe in Section 4-65, "Reinforced Concrete Pipe," of this manual.

Section 68 Subsurface Drains

4-6801 General
4-6801A Underdrains
4-6801B Horizontal Drains
4-6801C Edge Drains

4-6802 Before Work Begins
4-6802A Underdrains
4-6802B Horizontal Drains
4-6802C Edge Drains

4-6803 During the Course of Work
4-6803A Underdrains
4-6803B Horizontal Drains
4-6803C Edge Drains

4-6804 Measurement and Payment

Section 68 Subsurface Drains

Section 68
Subsurface Drains

4-6801 General

4-6801
General

This section covers three types of subsurface drains: underdrains, horizontal drains, and edge drains.

Subsurface drains remove groundwater from natural soils and formations. The drains are intended to intercept groundwater or lower its level before it adversely impacts the highway.

Be alert for indications of problem groundwater, particularly before clearing and during grading. Swamps, bogs, springs, and areas of lush growth are possible indicators of excess groundwater. Carefully inspect fill foundations before starting embankments. As excavation progresses, personnel may encounter standing water or various aquifers near slopes or at the grade.

If problem groundwater is found, it may be necessary to add subsurface drains.

For anything but minor investigation to determine subsurface conditions, request assistance from the district materials engineer or the district geologist.

4-6801A Underdrains

Underdrains consist of perforated pipe placed in permeable material. Single installations, in which a pipe and filter material are placed in a narrow trench, are used at the following locations: along the toe of a cut slope; along an upstream (with respect to groundwater) toe of fill; and across the roadbed at the lower end of a through cut.

Multiple installations of perforated pipe are used in permeable blankets and stabilization trenches. Permeable blankets are placed over the width of a roadbed and may be considered part of the structural section.

Permeable material is enclosed in filter fabric, which prevents the migration of fine material into the permeable material.

Pipes that act to collect groundwater must be perforated or slotted; however, pipes that discharge collected water should not be perforated or slotted.

When feasible, the contractor should locate underdrain systems below the invert of adjacent storm water systems. When working in the presence of high groundwater tables and highly erodible soils, consider using watertight joints in culverts.

4-6801B Horizontal Drains

Horizontal drains are made from 40-mm schedule 80 polyvinyl chloride (PVC) pipes. Horizontal drains can be slotted, perforated, or plain. They are placed in holes drilled into aquifers. Normally they are placed in cut slopes or under fills, and their purpose is to reduce the possibility of slides or slipouts.

The extent of groundwater may be determined with exploratory, vertical wells. Where the wells may be kept open, such wells serve as gauges to indicate changes in the

elevation of the water table. However, in many cases, it is obvious that groundwater requires drainage by horizontal drains because of signs of distress or saturation at the surface. Then, the exploration and installation of drains may occur concurrently. Each newly installed drain adds information needed to solve the problem. For instance, the extent of the aquifer may be discovered or the volume of flow will indicate whether more, or fewer, drains are required.

4-6801C Edge Drains

These are installed beneath a paved shoulder, just out from the edge of the portland cement concrete pavement. Slotted PVC pipe is placed within asphalt-treated or cement-treated permeable material that is partially encapsulated in filter fabric. These drains remove water from the structural section and prevent migration of fine material from the base or subbase to the area beneath the slab.

4-6802 Before Work Begins

4-6802 Before Work Begins

During this preliminary inspection, take the following steps:

- Ensure the contractor requests staking for control of line and grade.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers all fabricated materials. (See Section 6-2 "Acceptance of Manufactured Material and Sampling Methods" and Section 6-3 "Field Tests," of the *Construction Manual* (manual) for details.)
- Upon delivery of the materials, note whether Form TL-0624, "Inspection Release Tag," identifies the pipe. Note the condition of the pipe and, if applicable, either require repair of minor damage or reject the pipe because of more serious damage.
- Ensure that permeable material is of the class required under the contract.
- Double-check to ensure the use of the proper type and size of materials at each location, and verify the planned quantities for solid and perforated pipe.

4-6802A Underdrains

- Review the locations planned for underdrains to ensure that all areas requiring underdrains have been identified.
- Review Sheet D102 of the *Standard Plans* for underdrain details.

4-6802B Horizontal Drains

- Determine the drain locations and sequence of placement based on plans, exploration work, and observations during excavation. Determine the system by which horizontal drains will be designated and marked, and provide the contractor with this information.
- Plan the placement of collectors and outlets so they are positioned for public safety and ease of maintenance operations.
- Verify planned quantities.

4-6802C Edge Drains

- See Section 4-29, "Treated Permeable Bases," of this manual for guidelines for the production of treated permeable material.
- Verify planned quantities.
- Review sheets D99A, D99B, D99C, and D99D in the *Standard Plans* for edge drain details.

4-6803 During the Course of Work

4-6803
During the Course of Work

During the work, take the following steps:

- Subsurface drains are hidden from view for the most part, so ensure complete as-built records are created. Pictures, plans, elevations, and complete descriptions will enable efficient and more complete maintenance and repair.
- Ensure the contractor conforms to the water pollution control plan in handling any water discharged from subsurface drains.

4-6803A Underdrains

- Immediately before placing the filter fabric, examine the condition of the trench. Require the contractor to remove any loose material and also any sharp objects that may damage the filter fabric.
- Observe the placement of the filter fabric, and ensure that any tears or punctures are repaired as specified.
- Ensure that permeable material is of the class required under the contract.
- In accordance with frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual, test the permeable material for all specified attributes.
- Initially, more frequent testing may be advisable if any indication exists that segregation or contamination is occurring during handling and placing.
- Require the contractor to place pipe in the manner specified in Section 68-1.03, "Installing Underdrains," in the *Standard Specifications*.
- Terminal cleanouts and intermediate risers are vulnerable to damage throughout the contract's life. Before recommending contract acceptance, ensure they are in good condition.

4-6803B Horizontal Drains

- Require the contractor to determine the elevation of drilled holes at specified intervals. Record these for inclusion in the permanent records.
- Determine the length of nonperforated pipe to be placed at the drain mouths. Use the minimum specified length when the aquifer extends to the surface. Require outlet pipes to be connected to the collector system.
- Require the space between the drilled hole and the pipe to be tightly plugged with earth as specified.
- Keep a boring log of material types encountered during drilling, and also keep a log of production rates.
- Each drain must be identified by a brass plate bearing an assigned number or other label. Collect data about the drain's location, outlet elevation, grade, lengths of drilled hole and casing, plan of system, and flow. Furnish this data, including the identification information, to the Office of Geotechnical Services in the Division of Engineering Services.
- For the most part, horizontal drains are hidden from view, so ensure complete as-built records are created. Pictures, plans, elevations, and complete descriptions will enable efficient and more complete maintenance and repair.

4-6803C Edge Drains

- Inspect trench excavation for proper location, alignment, and cross-sectional dimensions. Require the contractor to remove any loose material and also any sharp objects that may damage the filter fabric during installation.
- Observe the installation of the filter fabric. Require that it be free of wrinkles and that any tears or punctures are repaired as specified.
- Verify that the contractor meets the requirements for atmospheric temperature and mix temperatures for cement-treated and asphalt-treated permeable materials.
- Cement-treated permeable material delivered in truck mixers may have a tendency to segregate at the end of the load. When the material is obviously segregated, do not permit its use. An excess of fines and water can enter and plug the slotted pipe. Moreover, an overly coarse aggregate grading may not bond and will be unstable.
- Require that the curing of cement-treated permeable material meets specifications.
- Require that edge drains, vents, and cleanout pipes be tested, as required by the specifications, for obstructions. Animal guards, if required, should be positioned immediately after the placement of the drains. Pipes may also be damaged by asphalt-treated material that is too hot or may be plugged by excessive free mortar in cement-treated permeable material. Observe all testing, and record that it was done. Require the replacement of any pipe that the flushing nozzle cannot penetrate.
- For the most part, edge drains are hidden from view, so ensure complete as-built records are created. Pictures, plans, elevations, and complete descriptions will enable efficient and more complete maintenance and repair.

4-6804 Measurement and Payment

4-6804 Measurement and Payment

Measurement and payment must conform to the special provisions, *Standard Specifications*, or both.

Underdrains, horizontal drains, and edge drains each have different measurement and payment clauses.

For underdrains and edge drains, see Section 4-65, “Reinforced Concrete Pipe,” in this manual for a discussion of slope length designated by the engineer. Note that in sections, 68-1 “Underdrains,” and 68-3, “Edge Drains,” of the *Standard Specifications* the actual length designated is to be paid for, and no provision exists for paying for additional length due to cutoff.

As horizontal drain installation progresses, measure the length of drain placed so that a final quantity can be determined.

Section 69 Overside Drains

Section 69
Overside Drains

4-6901 General

4-6901
General

Overside drains consist of various types of pipes, flumes, and lined ditches installed to remove surface water from highways or from benches in cut or fill slopes.

4-6902 Before Work Begins

4-6902
Before Work Begins

During this preliminary inspection, take the following steps:

- Review the project with the maintenance superintendent to assess any problem drainage areas.
- Review sheets D78, D87A, D87B, D87C, and D87D in the *Standard Plans* for information on downdrains and overside drains.
- Verify the receipt and proper distribution of Form CEM-3101, “Notice of Materials to Be Used,” which covers all fabricated materials. See Section 6-2, “Acceptance of Manufactured Material and Sampling Methods,” and Section 6-3, ”Field Tests,” of the *Construction Manual* (manual) for details.
- Upon delivery of the materials, note whether they are identified by marks or inspection tags, using Form TL-0624, “Inspection Release Tag.”
- Check the condition of the materials to discover any damage possibly sustained during handling after the source inspection. Require the repair of minor damage to coatings or galvanizing. (See Section 66-1.03, “Protective Coatings, Linings, and Pavings,” and Section 75-1.05, “Galvanizing,” of the *Standard Specifications*). If satisfactory repair cannot be achieved, require unacceptable materials to be removed from the project.
- Inspectors from the Office of Materials Engineering and Testing Services (METS) will inspect and test any joint materials.
- Normally, the METS inspector will have obtained certificates of compliance and mill test reports. Project personnel do not need these documents if materials are properly identified as previously inspected.
- Review any planned installations of metal beam guard railing. If overside drains are in a metal beam guard railing area, consider using long span nested guard rail. (See the *Traffic Manual,* Chapter 7-03.5, “Design Considerations” and Figure 7.5, “Long Span Nested Guard Rail”.)
- Review plans and planned overside drain locations by verifying design with the actual field surveys. Make any necessary changes and give the contractor a revised list of lengths.

4-6903 During the Course of Work

During work, take the following steps:

- Determine that pipe sections have watertight joints and are properly installed.
- As specified in Section 19 of the *Standard Specifications*, ensure the contractor disposes of the surplus material resulting from excavation and performs the backfill.
- Ensure entrance areas are watertight.
- Require fog sealing of all asphalt concrete spillways and downdrain entrance areas.
- You can determine the exact location of overside drains, in an area where the grade is flat, by having a water truck dump part of its load in the gutter and then by cutting the dike where the water ponds.

4-6904 Measurement and Payment

Count entrance tapers, tapered inlets, reducers, slip joints, and anchor assemblies. The length of downdrain pipe and flume to be paid for is the length ordered by the engineer with an adjustment when downdrain pipe is cut to fit a structure or slope. The length ordered by the engineer is the length shown on the plans or any revised lengths the resident engineer deem necessary to meet field conditions. In the lengths of pipe and flume downdrains to be paid for, do not include lengths of tapered inlets and entrance tapers (including tail pipe and slip joints).

For additional information, see the discussion on measuring pipe in Section 4-65, “Reinforced Concrete Pipe,” of this manual.

Section 70 Miscellaneous Facilities

Section 70 Miscellaneous Facilities

4-7001 General

4-7001 General

Items covered under this section are related to drainage facilities or transmission pipe lines. Section 70-1.01, "Description," of the *Standard Specifications* lists the various facilities included.

4-7002 Before Work Begins

4-7002 Before Work Begins

Before work begins, take the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists miscellaneous facilities.
- Before the contractor places orders, notify the contractor of any changes affecting quantities of miscellaneous facilities.

4-7003 During the Course of Work

4-7003 During the Course of Work

Once work begins, take the following steps:

- Check all items as they are delivered to the job site to ensure that the Office of Materials Engineering and Testing Services has released the materials for shipment. Also, inspect the materials in accordance with Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of the *Construction Manual* (manual). Pay particular attention to precast concrete facilities and linings and coatings. Throughout the life of the project, continue to observe and inspect these items for any possible damage by the contractor's operation.
- Determine that the various components at each installation are properly matched. Prohibit the combined use of aluminum and steel in the same installation except as the specifications permit.
- Observe and record the results of any pressure tests of welded steel pipes.
- Before constructing pipe manholes or inlets to the final grade, require that new pavement or surfacing be completed immediately adjacent to the structure.

4-7004 Measurement and Payment

4-7004 Measurement and Payment

For examples of determining the slope length designated by the engineer in the measurement of welded steel pipe, see Section 4-65, "Reinforced Concrete Pipe," of this manual. Note that no adjustment in length is specified when welded steel pipe is cut to fit a structure.

To properly measure and pay for the various items covered in this section, carefully read the measurement and payment clauses in the *Standard Specifications*. Payment for some items, but not all, includes payment for structure excavation and backfill. The measurement and payment clauses also refer to other sections of the *Standard Specifications* for some of the work that must be measured and paid for in accordance with those sections.

Section 72 Slope Protection

4-7201 General

4-7202 Before Work Begins

4-7203 During the Course of Work

4-7203A Rock Slope Protection
4-7203B Sacked-Concrete Slope Protection
4-7203C Gabion Basket Protection
4-7203D Concrete Slope Protection
4-7203E Concreted-Rock Slope Protection
4-7203F Slope Paving

4-7204 Measurement and Payment

Section 72 Slope Protection

Section 72
Slope Protection

4-7201 General

4-7201
General

Section 72, "Slope Protection," of the *Standard Specifications* covers slope protection. The following (covered under the heading "During the Course of Work" below) are some of the common types of slope protection used by Caltrans:

- Rock slope protection
- Gabion basket protection
- Concrete slope protection
- Concreted-rock slope protection
- Slope paving

Other protective devices are used in conjunction with highway construction, and when used, they are included in the contract's special provisions.

If extensive slope protection problems are anticipated or encountered during construction, refer these to the design engineer and the project manager, who may in turn obtain the advice of the "Caltrans Joint Bank Protection Committee."

Resident engineers should be familiar with the material contained in the publication *California Bank and Shore Rock Slope Protection Design* and Section 870, "Channel and Shore Protection—Erosion Control," of the *Highway Design Manual*.

4-7202 Before Work Begins

4-7202
Before Work Begins

Before construction of any type of slope protection, review the plans, *Standard Specifications*, special provisions, any pertinent preliminary test data, and the location of the installation. Note any changes that may have occurred between the preliminary design studies and the start of construction. Decide whether modifications are necessary as a result of changed conditions. In making such a decision, observe the following:

- High water elevations
- Direction of flow and angle of impingement at various water stages
- Type of adjacent soils capable of resisting erosion from wash and eddy currents
- Type and security of trees or brush
- Any springs or water courses that might affect the stability of the design
- For the record, take pictures of existing conditions.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists the materials for slope protection. Obtain initial samples and have them tested for the specified attributes.

4-7203 During the Course of Work

Take the following steps when inspecting the work and materials for slope protection:

- For tests on rocks, submit representative pieces of the rock that will be used in the work. The samples will be crushed in the laboratory to the sizes needed to perform the tests.
- Sample cement according to the procedure outlined in "Material Accepted on the Basis of a Certificate of Compliance," in Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of the *Construction Manual* (manual).
- Obtain samples of the concrete aggregate for initial and acceptance tests. Testing must follow the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual.
- Where applicable, inspect the footing areas and foundations for evidence of instability or areas where hydrostatic pressures may develop. Order corrective work when necessary. As a minimum, the plans indicate the depths of foundations. When evidence exists that the depth is inadequate, the contractor should deepen the foundation with concurrence from the design engineer and the hydraulics engineer. Of the various types of instability problems, foundation failures are the most serious and most common.
- Also check to ensure that slopes and foundation areas are graded and compacted to specified tolerances.
- When changes are made, maintain records of details, depths, heights, and other dimensions, and enter these on the as-built plans.
- Ensure that rocks of the specified sizes and shapes are being used. You may check the size of rock by roughly measuring the size and converting the volume to mass. To better control the contractor's selection of rocks for placing, we suggest painting the tonnage on large rocks used in foundation construction.
- Verify the types of measurements and records necessary to support payment for the work. Keep such records up to date.
- Protect existing shrubs and trees so that they continue to anchor the surrounding soil. Erosion control is an important element of successful slope protection. In addition to the general functions discussed above, the following items apply to specific types of slope protection.

4-7203A Rock Slope Protection

The *Standard Specifications* provide two methods of placement for this type of protection: Method A and Method B. The contract will identify the designated method.

Method A is used where the stability of the rock slope protection is considerably dependent on the manner in which the individual rocks are placed. To ensure the success of Method A, ensure that the bearing of rocks from one to the other follows specifications and that the use of "chinking" rocks is limited to filling voids. When placing rocks, the contractor should ensure each placed rock is stable and not dependent on the one on top to hold it in place. Otherwise, placement could result in what is known as "rockers" or unstable rocks. Also, ensure the contractor does not drop rock into place; otherwise, cracking or breaking may occur.

Method B is not restrictive with respect to the placement of individual rocks.

When rock slope protection fabric is required for either method, ensure the contractor places the fabric before placing the rock slope protection. See Section 4-88, "Engineering Fabrics," of this manual for guidelines for inspecting and accepting rock slope protection fabric. Close observation is required during rock placement to detect any damage to the fabric.

4-7203B Sacked-Concrete Slope Protection

This type of protection is used when a number of serious failures have occurred. The failures are usually associated with the foundation or water getting behind the slope protection and "peeling off" the protection.

At the terminals and intermediate points, the plans provide for the construction of endwalls, cutoffs and end returns. These devices are intended to prevent erosion behind the protection, and depending on field conditions, may need to be extended.

When possible, the terminals of slope protection should be tied into existing, undisturbed natural features that resist erosion, such as large boulders or rock outcrops.

The bond between the burlap-type sacks and the courses results from the exuding of mortar through the sacks. Should the bond be inadequate, the contractor can strengthen the bond by driving steel dowels or reinforcing bars through the courses as they are constructed.

"Stretchers" are those sacks placed with their lengths parallel to the bank. "Headers" are placed at right angles to stretchers. See that the sacks are placed in the manner specified. Periodically measure the work to ensure that the face coverage is within allowable tolerances.

Observe the curing operation to ensure that water is sprayed onto the slope protection at the specified intervals and for the required length of time. Note such observations in the daily report.

Finally, for measurement purposes, perform California Test 518, "Unit Weight of Fresh Concrete," to determine the unit weight of the concrete.

4-7203C Gabion Basket Protection

This method consists of placing wire mesh box-shaped baskets filled on-site with hard, durable rocks. The gabions are placed on filter fabric as detailed in the plans and specifications.

At the start of gabion placement, require the contractor to verify the minimum unit mass of the gabions to ensure the minimum mass meets specifications. If you have any questions about the consistency of the gabions, you may also order the mass to be verified during the course of the work.

4-7203D Concrete Slope Protection

This method consists of paving the embankment with portland cement concrete. The method is particularly adaptable to locations where high-velocity flow is not detrimental, but desirable, and the hydraulic efficiency of smooth surfaces is important.

Review Section 4-90, "Portland Cement Concrete," of this manual for details about concrete production. When shotcrete is to be used, review Section 4-53, "Shotcrete," of this manual.

Check the area to be protected to ensure that the required expansion joints are in place.

Review the plans for the location and number of weep holes. Decide whether an adequate number has been provided for the particular installation. If necessary, order additional weep holes.

Ensure that the contractor performs concrete finishing as specified and that the slope paving is cured by one of the specified methods.

4-7203E Concreted-Rock Slope Protection

This method is used where large rock is not economically available in large quantities, yet a heavy, service type of protection is required. Protection involves constructing a heavy mass of smaller rocks bound together by concrete.

To provide the desired cleanliness, the contractor may need to sluice the rock or facing. If the rock contains an excess of fines or inadequate voids, the desired results may be impossible to obtain.

The specifications stress the desirability of a roughened surface finish. If excess concrete remains on the surface, the finished product, when used in streams, will be too smooth and, along the protection, velocities will increase beyond those intended during design.

To compensate for the lack of flexibility in the completed structure, ensure an adequate foundation lies below this type of protection.

At the terminals of protection, ensure the contractor is particularly careful to avoid erosion and undercutting. The contractor must also ensure the construction of adequate "returns" and "keys" at the ends.

For details about concrete production, review Section 4-90, "Portland Cement Concrete," of this manual. The method for placing rock will either be Method A or Method B, whichever the contract designates, as discussed under Section 4-7203A, "Rock Slope Protection," earlier in this section.

Before placing the concrete, inspect the rock to ensure it has been cleaned of any adhering dirt and clay and then moistened.

For measurement purposes, perform California Test 518, "Unit Weight of Fresh Concrete," to determine the unit weight of the concrete.

Ensure the contractor brushes the surface, exposes the rocks as specified, and cures the work by one of the specified methods.

4-7203F Slope Paving

For details about concrete production, review Section 4-90, "Portland Cement Concrete," of this manual. When shotcrete is to be used, review Section 4-53, "Shotcrete," of this manual.

When specified, ensure coloring is added to the concrete.

Ensure the timber spacers are of the required material and spaced as planned.

Observe construction to ensure the contractor does the placing, finishing, and curing as specified.

4-7204 Measurement and Payment

4-7204 Measurement and Payment

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

For measuring concrete or shotcrete, refer to Section 4-90, "Portland Cement Concrete," or Section 4-53, "Shotcrete," of this manual.

Section 73 Concrete Curbs and Sidewalks

Section 73 Concrete Curbs and Sidewalks

4-7301 General

4-7301 General

This section covers concrete curbs and sidewalks. For information on the production and transportation of portland cement concrete, see Section 4-90, "Portland Cement Concrete," of the *Construction Manual*.

For specifications about the construction of concrete curbs and sidewalks, see Section 73, "Concrete Curbs and Sidewalks," of *the Standard Specifications*.

4-7302 Before Work Begins

4-7302 Before Work Begins

During this preliminary review, take the following steps:

- Review the contract for details about the project's concrete curbs and sidewalks, and compare these details with conditions in the field. As appropriate, review sheets A87, A88A, and A88B of the *Standard Plans*.
- Before constructing any curbs, gutters, or sidewalks other than those shown on the plans, review the *Highway Design Manual* to determine the policy. Ensure the curbs, gutters, or sidewalks do the following:
  1. Conform to the current policy of replacing existing facilities
  2. Or, are necessary to comply with previous agreements
  3. Or, are necessary to provide proper drainage
- Discuss the construction operation with the contractor. Determine whether the contractor has considered the public's convenience, a consideration required by Section 7-1.08, "Public Convenience," of the *Standard Specifications* and also by applicable sections of the special provisions. Advise the contractor of any necessary modifications to the operation.
- Make a general check of the layout as staked, including the location of gutter depressions, curb ramps (wheelchair ramps), and driveways. Also review the stakes for accuracy.
- Ensure that an approved grading for the combined aggregate for minor concrete is on file in the project records. Note that any testing of minor concrete is at the resident engineer's discretion. Normally, testing is not necessary for minor concrete produced at a plant with a good history of producing concrete for Caltrans work. For minor concrete from a source that has not been previously used on the project, require the contractor to submit a Certificate of Compliance.
- Examine the subgrade to ensure the following:
  1. The subgrade has been constructed to the proper elevation and cross section. As specified, require the contractor to check the subgrade with a template.

2. The foundation has been watered and compacted. When the subgrade is constructed in a structural layer, the compaction required in such a layer usually applies. When the subgrade is original ground outside of those areas where 95 percent compaction is required, no specific compaction value is required; however, to obtain a stable foundation, a watering and compacting operation is required. Unless the contractor chooses to allow soft or spongy areas to dry before placing concrete, order their removal.

3. The subgrade is wet immediately before placing concrete.

- Ensure the contractor has implemented appropriate measures for washing out concrete mixer trucks.

4-7303 During the Course of Work

4-7303 During the Course of Work

Once work begins, take these steps:

- Examine the forms to ensure the following:

  1. The forms are smooth on the side next to the concrete.

  2. They have a true, smooth upper edge.

  3. They are rigid enough to withstand the pressure of fresh concrete without distortion. Order the replacement of forms that will not produce an end product within specified tolerances.

  4. The forms are coated with form oil as specified.

  5. The forms have the specified full depth.

  6. The forms are placed to the lines and grades shown on the control stakes. Also, ensure the adjustment of any unsightly changes in vertical or horizontal alignment. Adjustment from staked grades is sometimes necessary near joints with existing curbs or sidewalks.

- Ensure that gutters will drain. When new curbs are to be joined with existing facilities, check the existing elevations against the planned grades.

- Ensure that curb and sidewalk construction conforms to the contract's "Order of Work" in the special provisions.

- Finished appearance is important and is noticeable by the public. Existing edges of pavement and sidewalks or existing pavement surfaces should not be used directly to establish a grade line for curbs.

- Ensure that all dowels and reinforcements are in place.

- In fixed-form construction, the contractor may choose to use anchor bolts instead of dowels. When the bolts are equivalent to the dowels, approve the use of the bolts.

- Ensure joints are sawed as specified.

- For extruded-form construction, the contractor may choose to use an adhesive instead of dowels. When this option is chosen, ensure the contractor cleans the pavement as specified and uses the required adhesive. Inspect the slipform machine to ensure it meets specifications.

- Inspect the placement of weakened plane and expansion joints to ensure they are constructed as specified.

- During the placement of minor concrete, check temperatures, mixing time, elapsed time, number of revolutions, and penetration. Ensure that load slips, with the required information, are delivered with each load of minor concrete.
- Observe concrete as it is placed. In the daily report, record the reasons for rejecting any concrete and the approximate amount rejected. Ensure the contractor does not allow concrete to segregate while being placed and being compacted in the forms. Stop the operation if the concrete requires patching with grout or mortar. Insist the contractor correct the placing operation.
- Before the forms are removed, ensure the contractor uses the required 3m float to finish the surface.
- Note whether the forms are being removed within the specified time limits. When corrective measures are necessary, advise the contractor, and note such advice in the daily report.
- Ensure the finishing meets specifications, and measure the finished product to ensure it conforms to the required tolerances.
- Ensure the curing complies with one of the specified methods.
- Ensure the contractor does not place concrete on frozen or ice-coated material and protects the concrete after placement according to the specifications.

4-7304 Measurement and Payment

4-7304 Measurement and Payment

Measure concrete curbs and sidewalks by the cubic meter from the dimensions shown on the plans or by longitudinal field measurement.

To determine pay quantities for curb when minor concrete is paid for by the cubic meter, you may use the table for curb quantity factors (cubic meter/meter) in the *Standard Plans.*

Section 74 Pumping Plant Equipment

Section 74 Pumping Plant Equipment

4-7401 General

4-7401 General

Section 74, "Pumping Plant Equipment," of the *Standard Specifications* includes specifications for furnishing and installing drainage pumping equipment and pumping plant electrical equipment. For additional information regarding pumping plant equipment, see Section 161, "Pumping Plants," of the *Bridge Construction Records and Procedures Manual*.

4-7402 Before Work Begins

4-7402 Before Work Begins

In accordance with Section 5-1.02, "Plans and Working Drawings," of the *Standard Specifications*, the contractor must submit for approval working drawings and a list of proposed materials. The drawings and materials list must be submitted directly to the Office of Structure Design, documents unit. The submittal is reviewed through a coordinated effort between the Office of Structure Design and the Office of Structure Construction. Within the Office of Structure Design, the Office of Electrical, Mechanical, Water and Wastewater Engineering will review the submittal and has the primary responsibility for approving the working drawings and materials list.

4-7403 During the Course of Work

4-7403 During the Course of Work

During the work, take the following steps:

- Verify that the equipment and materials installed by the contractor are the same as those approved on the materials list.
- Before the final acceptance of the work, the contractor must test the pumping plant equipment. Notify the Office of Electrical, Mechanical, Water and Wastewater Engineering of the upcoming tests so representatives from the office may be present to witness the testing.

4-7404 Measurement and Payment

4-7404 Measurement and Payment

For the basis of measurement and payment, refer to the appropriate sections of the special provisions and *Standard Specifications*.

Section 75 Miscellaneous Metal

Section 75 Miscellaneous Metal

4-7501 General

4-7501 General

This section presents some steps assistant resident engineers should follow when inspecting the installation of any miscellaneous metals for a construction project. Miscellaneous metals include miscellaneous iron and steel, miscellaneous metal (bridge), miscellaneous metal (restrainer), and pumping plant metal work.

4-7502 Before Work Begins

4-7502 Before Work Begins

Well in advance before the start of work, review the contract plans and note all the miscellaneous metals to be installed on the project. Reviewing these items sufficiently in advance helps prevent scheduling conflicts and errors in ordering materials. During the preliminary review and inspections, the assistant resident engineer should also do the following:

- Verify the receipt and proper distribution of Form CEM-3101, “Notice of Materials to Be Used”, which covers miscellaneous metals.
- If required, obtain from the Office of Materials Engineering and Testing Services (METS) approval of foreign manufacturers before the manufacturers furnish the materials. (Refer to Section 6-1.08 of *the Standard Specifications*, which covers the use of foreign materials.)
- Upon delivery, check the materials’ identification marks or inspection tags (using Form TL-0624, “Inspection Release Tag”) and match these marks and tags against those listed in Form TL-0029, “Report of Inspection of Material.” See Section 6-2, “Acceptance of Manufactured Material and Sampling Methods,” of the *Construction Manual* (manual) for more explanation.
- Require the repair of any minor damage to galvanizing or coatings, as specified in Section 75-1.05 of the *Standard Specifications*.
- Refer to the contract specifications and Section 3-605, “Certificates of Compliance,” of this manual regarding Buy America requirements.

4-7503 During the Course of Work

4-7503 During the Course of Work

During work operations, the assistant resident engineer should do the following:

- Ensure that any welding of miscellaneous metals conforms to American Welding Society (AWS) D1.1 or as specified in the contract documents.
- Ensure that frames and grates or frames and covers are match marked.
- Ensure that deck drains and other grating openings are covered until final cleanup of the deck.
- Require testing of deck drains as specified.

Additional information about mechanical anchorage devices and high strength bolts can be found in sections 135 and 170 of the *Bridge Construction Records and Procedures Manual*, respectively.

4-7504 Measurement and Payment

4-7504 Measurement and Payment

Require scale weights for miscellaneous metal unless quantities are designated as final pay quantities. Make the specified deductions when materials are remotely manufactured, per Section 75-1.07, "Payment," of the *Standard Specifications*.

Section 80 Fences

Section 80
Fences

4-8001 General

4-8001
General

This section describes the work for constructing barbed wire fence, wire mesh fence, and chain link fence.

4-8002 Before Work Begins

4-8002
Before Work Begins

Review the plans, special provisions, and right-of-way agreements for any special details. If it is necessary to revise, add, or delete fence on a contract, review the *Highway Design Manual* for the general policy on such actions and consult with the project engineer if necessary. You should also do the following:

- Do not move, add, or delete gates or openings without first consulting the design project engineer, the maintenance engineer, and other interested parties. If federal funds are involved, ensure the Federal Highway Administration (FHWA) approves any changes.
- Be alert to the necessity of constructing fences to prevent livestock escaping from adjacent properties. (Section 15-2.05B of the *Standard Specifications*)
- Compare the planned location with actual field conditions to ensure that fences, gates, openings, and other fencing items will serve as intended.
- Fences should not obstruct flow in streams or drainage areas.
- It is also possible to construct fences on top of retaining walls and wing walls. Wherever this type of construction is necessary, check the location of postholes, and ensure provision is made for future post installation.
- Upon delivery of the materials to the job site, note whether they are identified by marks or inspection tags (use Form TL-0624, “Inspection Release Tag”) and match these marks or tags against Form TL-0029, “Report of Inspection of Material.” Determine the final acceptability of the fence material as outlined in the Table 6-2.1 entitled “Inspection of Fabricated and Manufactured Materials” in Section 6-2, “Acceptance of Manufactured Material and Sampling Methods,” of the *Construction Manual* (manual).
- Arrange for necessary control staking when the contractor has submitted the required survey request.

4-8003 During the Course of Work

4-8003
During the Course
of Work

During work operations, take the following steps:

- Ensure the grading of areas in which fence is to be placed and the excavation of high points that interfere with the placing of wire or mesh. However, do not permit indiscriminate clearing where clearing and grubbing is restricted to the slope line.

- Observe the placing of fence posts. Also, measure the spacing of posts and sufficiently measure the depth of holes to ensure placement to proper depths. Note such measurements in the daily report. Spacing should not exceed the spacing specified or shown in the plans.
- Observe the placement of corner posts and pull posts to ensure they are placed at required locations and according to specified details. Also, ensure that the proper type and number of brace posts and diagonal wires are used. The configuration of the brace posts depends on the distance between the corner post and the next corner, end, or pull post.
- Decide on which side of the posts the contractor should place fabric when the side is not specified. For barbed wire and wire mesh fence, the barbed wire or wire mesh is placed on the property owner's side of the posts, unless otherwise shown on plans or in right-of-way agreements. For chain link fence, the fabric generally is placed on the highway side of the posts. However, the wire or fabric may be placed on either side, and it is recommended that the maintenance superintendent be consulted for any preference.
- Inspect the fastening of wire or fabric to ensure the use of specified materials and methods.
- Ensure fencing is snubbed or guyed at all grade depressions as specified.

4-8004 Measurement and Payment

4-8004 Measurement and Payment

Keep records and make measurements of fence construction sufficient to support both partial and final payment. Pay only for completed lengths except for incidental work as covered in Section 3-9, "Measurement and Payment," of this manual.

Consider using a tracking system to help prevent duplication or omissions of quantities.

Section 81 Monuments

Section 81
Monuments

4-8101 General

4-8101
General

This section describes the work for constructing survey monuments.

4-8102 Before Work Begins

4-8102
Before Work Begins

During this preliminary inspection, take the following steps:

- Upon delivery of the materials to the job site, note whether they are identified by marks or inspection tags (use Form TL-0624, "Inspection Release Tag") and match the marks or tags against Form TL-0029, "Report of Inspection of Material." Determine the final acceptability of the frame and cover as outlined in the Table 6-2.1, "Inspection of Fabricated and Manufactured Materials" in Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of the *Construction Manual*.
- Arrange for necessary control staking when the contractor has submitted the required survey request. Control staking must be sufficient to set the disk to the accuracy required in the specifications.

4-8103 During the Course of Work

4-8103
During the Course of Work

Check materials, dimensions, details, finish, and cure for compliance with specifications. Many monuments that existed before construction must be preserved or reset. The surveys unit should perform any resetting. If previously undiscovered monuments are found during construction, request the surveys unit to investigate and handle or recommend action to be taken.

4-8104 Measurement and Payment

4-8104
Measurement and Payment

The contractor must pay for relocating monuments lost or damaged by the contractor's operation. See section 7-1.11, "Preservation of Property," in the *Standard Specifications*.

Section 82 Markers and Delineators

Section 82 Markers and Delineators

4-8201 General

4-8201 General

This section describes the work for providing and installing markers and delineators at locations shown on the plans or where the engineer directs. Object markers are used to mark obstructions within or adjacent to the roadbed (including paved shoulders). Delineators are reflective devices mounted at the side of the roadway, in a series, to indicate the roadway alignment.

4-8202 Before Work Begins

4-8202 Before Work Begins

Before work begins, take the following steps:

- Review the marker and delineator lists shown on the plans and inform the contractor of any changes, preferably before material is ordered or information is stenciled on the markers. (The *Traffic Manual* provides design details for markers and delineators.)
- Determine the proper receipt and distribution of Form CEM-3101, “Notice of Materials To Be Used,” which covers markers and delineators. All materials listed should be from the lists of approved products contained in the materials portion of the special provisions.
- Examine markers and delineators to ensure they are as specified. Verify that they match the materials shown on Form CEM-3101 and that a correctly prepared Certificate of Compliance accompanies the material.
- Provide the contractor with a list of kilometer values to be stenciled on kilopost markers.
- Verify that state furnished material has been ordered and obtained as identified in the special provisions.

4-8203 During the Course of Work

4-8203 During the Course of Work

Inspect the materials and method of installation as specified in the *Standard Specifications* and special provisions. This inspection will include, but is not limited to, the following steps:

- Ensure the contractor’s layout work conforms with the plans.
- Document and approve minor deviations from the plans.
- Before the material is incorporated, inspect material either by collecting the inspection tags or matching the material against information in the Certificate of Compliance.
- Ensure the contractor follows the method of placement, as specified in the *Standard Specifications* and the special provisions.

- During the installations of target plates, check that washers are used and that nuts and rivets are installed properly.
- After installation, check for any damage to the installed material and document any rejections.
- Do a night inspection to check and document the reflectivity of the installed material. If you encounter any problems, notify the contractor immediately so the contractor can make corrections.

4-8204 Measurement and Payment

4-8204 Measurement and Payment

Count markers and delineators, and record the counts to support partial and final payments.

Section 83 Railings and Barriers

4-8301 General

4-8302 Before Work Begins

4-8303 During the Course of Work

4-8303A Metal Beam Guard Railing and Thrie Beam Barrier
4-8303B Pipe Handrailing, Steel Bridge Railing, Cable Railing, Metal Railing (Tubular), and Chain Link Railing
4-8303C Concrete Barriers and Railing

4-8304 Measurement and Payment

Section 83 Railings and Barriers

Section 83 Railings and Barriers

4-8301 General

4-8301 General

Railings and barriers are used to reduce the severity of run-off-road accidents, to prevent out-of-control vehicles from crossing the median, and to decelerate errant vehicles. Construction personnel involved in the installation of railings, barriers, and other traffic safety systems should be familiar with Chapter 7, "Traffic Safety Systems," of the *Traffic Manual*. Chapter 7 discusses concepts and design considerations for traffic safety systems, including railings and barriers.

The following paragraphs discuss some of the details considered during design. The discussion centers on metal beam guard railing but can be applied to other types of railings and barriers.

The design for guardrail with end anchors contains many subtle details, the basis for which may not be readily apparent. Pay special attention to all connection details.

Impact tests and automobile configurations show that the specified height of 660 mm to 685 mm is necessary to prevent errant vehicles from climbing over the guardrail. Spacing posts 1905 mm apart provides resistance to guardrail deflection on impact and also lessens the tendency of the guardrail to form a pocket during impact.

A block spaces the guardrail out from the post. As a result, the contact area is moved away from the post so that little possibility exists of a vehicle snagging on the post. Also, the block allows the guardrail to rise slightly on initial impact, reducing a vehicle's potential for rolling.

When timber shrinks, it introduces enough slack in the mounting bolts to allow the timber blocks to rotate. Toenailing the blocks prevents this rotation.

When timber posts are used, the specified washers prevent bolts from pulling through when a vehicle strikes the guardrail. Also, during installation, the square hole in the plate washer will keep the carriage bolt from rotating.

For anchoring guardrail, anchor cables should be drawn up tautly. Cable clips must be installed correctly with the "U" on the short end of the cable and the saddle on the working end. Chapter 7 of the *Traffic Manual* discusses guardrail anchorage.

The metal box spacer used at the "structure" end of an approach guardrail allows the guardrail to approach the structure on a straight line and minimizes the possibility of vehicles snagging on the end of the bridge railing.

Frequently, when lateral clearances are limited, a proprietary end terminal system will be specified. When the plans and special provisions require end terminal systems, ensure the systems are installed according to the manufacturers' instructions.

4-8302 Before Work Begins

Before work begins, take the following steps:

- Carefully review the required details, and ensure construction conforms to them. Review the locations in the field, and decide whether any changes are necessary.
- If drainage inlets or other obstructions conflict with the planned locations for guardrail posts, consider using long span nested guardrail. (Refer to Chapter 7-03.5, "Design Considerations," and Figure 7.5 of the *Traffic Manual*.) Also, for information, consult with the district traffic engineer. If the contract does not provide for long span nested guardrail, a contract change order will be necessary.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists all fabricated materials. Examine the material as it arrives on the project to ensure the material meets specifications. Refer to Table 6-2.1, "Inspection of Fabricated and Manufactured Materials" in Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of the *Construction Manual* (manual).
- Look for the identification tags or markings that indicate the Office of Materials Engineering and Testing Services (METS) previously inspected the materials. If the materials are properly identified as previously inspected, project personnel do not need the certificates of compliance or mill test reports. Normally, the METS inspector will have obtained these documents.
- Ensure that markers and delineators for railings and barriers are the correct type and are covered by a Certificate of Compliance in accordance with the section titled "Prequalified and Tested Signing and Delineation Materials" in the special provisions.
- Review the contractor's stakes and layout work. Ascertain that offsets and flares for guardrail will be installed as shown on the plans.
- When connections to structures are required, coordinate this task with the Office of Structure Construction.
- Ensure all concrete mix designs have been approved before use.
- When applicable, discuss the allocation of work with the Office of Structure Construction.
- Review all shop plans for metal railing on structures.
- To avoid possible conflicts, verify scupper and side drain locations.
- To avoid possible conflicts, verify pull box and conduit locations.

4-8303 During the Course of Work

Once work begins, take the steps below for the following types of railings and barriers:

<u>4-8303A Metal Beam Guard Railing and Thrie Beam Barrier</u>

For this type of guardrail and barrier, do the following:

- Measure wood posts at the job site to ensure they conform to the specifications.
- When required, ensure that bolt holes in treated posts are filled with grease. Make a note of this inspection in the daily report.

- Ensure that the backfilling of postholes conforms to specifications. Posts should be set to the full depth shown on the plans. When spread footings or other underground obstructions interfere with placing at full depth, refer to the *Standard Plans* for alternatives.
- Periodically measure the spacing of posts.
- Ensure that blocks for metal beam guard railing are toenailed to timber posts.
- Ensure that rail elements are lapped so that the exposed ends will not face approaching traffic. Check bolts for tightness and threaded rods for proper trimming.
- Measure the height of the guardrail and barrier above the ground to ensure that the height conforms to the plans.
- Ensure that connections to bridge railings, retaining walls, abutments, or other flat surfaces comply with specifications. When high-strength bolts are required, check the markings on the bolts to ensure they also match specifications. When necessary, consult with district laboratory personnel about the proper markings.
- Ensure that anchor assemblies are constructed as specified. Cable clips should be installed in the proper direction and tightened to the required torque. The METS inspector will normally have obtained, when required for testing, a sample cable with swaged fitting. Therefore, if cable is properly identified as previously inspected, project personnel do not need to obtain a sample.
- When posts are installed in loose soil or near embankment edges, it may be necessary to use longer posts or some design modifications to ensure a barrier with adequate strength. Refer to Sheet A77FA in the *Standard Plans*.
- Immediately before placing concrete, ensure that holes for concrete anchors and footings are excavated to the dimensions shown on the plans.
- Ensure that anchor cables are tight enough to prevent any obvious slack in the cable once the footing concrete has cured for the required period.
- Direct the disposal of surplus material from excavation. When traffic is using an adjacent lane, prohibit spoil piles or windrows of material to remain in front of guardrail or median barriers. Such material alters the effective height of the railings and barriers.
- Ensure that asphalt concrete dikes are positioned under the guardrail as shown on the plans.
- Bolts or threaded rods must be long enough so that the nuts are threaded completely onto the bolt. Ensure that no more than 13 mm of thread is exposed on the traffic side of the guardrail as shown on the plans.
- Ensure the construction of flares conforms to the plans.
- Keep adequate records and make sufficient measurements to support both partial and final payment.

4-8303B Pipe Handrailing, Steel Bridge Railing, Cable Railing, Metal Railing (Tubular), and Chain Link Railing

For these types of railings, do the following:

- Ensure materials and methods used in anchorage and connections conform to the specifications and the plans.
- Ensure the contractor connects, stretches and tightens cables, chain link fabric, and tension wires as required.
- Check railings for proper alignment, appearance, and workmanship.

4-8303C Concrete Barriers and Railing

For concrete barriers and railing, do the following:

- Prohibit the placement of concrete barriers or railing on new structures until after the falsework is released. The Office of Structure Construction will provide height adjustments to compensate for camber and dead load deflections.
- Review the specifications for closing temporary gaps in barriers during construction. Determine that the contractor has planned this work before removing existing barriers or constructing new barriers. Ensure that blunt ends exposed to traffic are adequately protected. Refer to the "Public Safety" section in the special provisions.
- Ensure forms comply with Section 51-1.05, "Forms," of the *Standard Specifications* For additional guidelines, see Section 4-51, "Concrete Structures," of this manual.
- When extrusion or slipform machines are used to construct concrete barriers, inspect the grade upon which the machine will ride to determine if the grade is smooth enough to prevent foreseeable violations of specified tolerances. Check the guide wires for any obvious variations or measurable sags between supporting stakes.
- Ensure that the placing of bar reinforcing steel conforms to specified requirements and the details shown on the plans. For guidelines, see Section 4-52, "Reinforcement," of this manual.
- Review the applicable specifications for producing, placing, finishing, and curing portland cement concrete to be used in concrete railing and barriers. For guidelines, refer to Section 4-51, "Concrete Structures," and Section 4-90, "Portland Cement Concrete," of this manual.
- Require that the forms for Type 50 and Type 60 series barrier are stripped early enough so that the concrete surface may be given a light brush finish without resorting to tempering with grout.
- During the placing of extruded or slipform barriers, the design of the concrete and placing method should be such that no hand finishing, other than a light brush finish, is required. The surface of the traffic side of the concrete median barrier should be as smooth as possible. Prohibit heavy brooming or any other activity that will leave a roughly textured finish.
- Observe the abrasive blast finish applied to Type 50 and Type 60 series concrete barriers. The surface should have a uniform appearance, without heavy texturing.

4-8304 Measurement and Payment

4-8304
Measurement and Payment

Measure railings, barriers, and terminal systems as specified and, where appropriate, to the limits shown on the plans. Also, by counting, determine the number of cable anchor assemblies and connections to be paid for.

Section 84 Traffic Stripes and Pavement Markings

Section 84 Traffic Stripes and Pavement Markings

4-8401 General

4-8401 General

This work consists of applying painted and thermoplastic traffic stripes and pavement markings. The special provisions may also allow the contractor to substitute traffic striping and pavement marking tape. The engineer's estimate and the contract plans will indicate when and where the contractor must use paint or thermoplastic.

4-8402 Before Work Begins

4-8402 Before Work Begins

Before work begins, the resident engineer should discuss the operation with the maintenance striping superintendent or supervisor. Ask if there are any particular striping or marking concerns or requests that should be addressed. In addition, the resident engineer should take the following preliminary steps:

- Discuss materials to be used with the contractor. If the contractor plans to use solvent-borne or acetone-based paint, ensure its use conforms to the regulations of the local agency for air pollution control.
- Review striping and marking plans, standard details, and any special requirements.
- Review existing field conditions. Consult with district traffic unit personnel if any changes appear to be necessary.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers striping tape, paint, thermoplastic material, and glass beads.
- Examine the material as it arrives on the project. Look for identification tags indicating that personnel from the Office of Materials Engineering and Testing Services previously inspected the material.
- Read the manufacturer's instructions for striping tape and thermoplastic materials. When primer is required, determine the type the manufacturer recommends. Also determine the application temperature range for the thermoplastic material.
- Inspect the contractor's equipment for specification compliance either in the contractor's or subcontractor's yard or on another project. Examine the contractor's methods for checking spread rates of paint and glass beads, application temperatures of thermoplastic material, and maximum temperatures of paint.
- Ensure that the contractor's stencils will produce correctly dimensioned pavement markings.

4-8403 During the Course of Work

During the work, do the following:

- Check the contractor's layout work. Determine that traffic stripes and pavement markings will be correctly located. Where necessary, assist the contractor to match existing striping cycles. Require that thermoplastic material be placed within the specified temperature range. Thermoplastic material heated to excessive temperatures can flash and splatter when exposed to air. Check for accuracy the temperature gages mounted on heating equipment. Employees working around thermoplastic material should wear suitable personal safety equipment, long-sleeved shirts, and eye protection.
- Before applying thermoplastic material, check and document the pavement temperature.
- Before applying paint, check and document the atmospheric temperature and expected weather conditions. Never apply paint when rain, fog, or condensation could damage the freshly painted surface.
- Require that paint temperatures not be allowed to exceed the specified maximums for solvent-borne or water-borne paints.
- Before applying striping or marking, check the condition of the pavement. Require the pavement to be dry and clean as specified.
- Check traffic stripes for the correct width and edge definitions, lengths of gaps and individual stripes, alignment, direction of application, and correct superimposition of second coats.
- Require the contractor to remove drips, overspray, improper markings, and material tracked by traffic.
- Check that the applied thermoplastic material complies with thickness requirements.
- Check application rates for glass beads and paint. Inspect the stripes to ensure that glass beads are spread uniformly and properly embedded.
- Check thermoplastic markings for workmanship as the markings are applied. Do not permit bumps resulting from overlaps in extruded materials.
- After application, look for any damage to striping or marking and document any rejections.
- Conduct and document an immediate night inspection to ensure the reflectivity of the installed material. If you encounter any problems, notify the contractor immediately for corrections.

4-8404 Measurement and Payment

4-8404 Measurement and Payment

Measure the striping and markings according to the units and manner specified in the *Standard Specifications* and the special provisions. Record such measurement in the daily reports and the calculation sheets to support partial and final payments.

The *Standard Specifications* require measurements along the line of the traffic stripe. Such measurement would normally be done with a measuring wheel or a vehicle-mounted electronic measuring device.

The areas of the various standard pavement markings are shown in the *Standard Plans*. You may use these areas in calculations to determine pay quantities. Where the areas are variable, such as for limit lines of variable lengths, you will need to make field measurements.

Section 85 Pavement Markers

Section 85 Pavement Markers

4-8501 General

4-8501 General

This work consists of furnishing and placing retroreflective, nonreflective, and retroreflective-recessed pavement markers. In addition to the information in this section of the *Construction Manual (*manual), see the following documents for more information:

- For details about placing pavement markers, see the "Pavement Markers and Traffic Lines, Typical Details" sheets of the *Standard Plans*.
- For the specifications for epoxy adhesive, see Section 95, "Epoxy," of *the Standard Specifications*.
- For the specifications for hot-melt bituminous adhesive, see Section 85, "Pavement Markers," of the *Standard Specifications*.

When specified, pavement markers may be placed using a moving lane closure to control traffic. Only bituminous adhesive is permitted when moving lane closures are used. The special provisions and *Standard Plans* provide details for moving lane closures.

In areas subject to snow, the specifications may require the contractor to place pavement markers in recesses in the pavement.

4-8502 Before Work Begins

4-8502 Before Work Begins

Before work begins, take the following steps:

- Review plans, the *Standard Specifications*, and the special provisions.
- Review the contractor's proposed method of controlling traffic and ensure that all the specified components of any required traffic control system are in place.
- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers pavement markers and adhesive material. Listed pavement markers should be from the lists of approved products contained in the materials section of the special provisions.
- Examine materials as they arrive on the project to ensure they are the same as the materials shown on Form CEM-3101 and that they arrive with a correctly prepared Certificate of Compliance.
- Take samples, when necessary, in accordance with the sampling frequency tables in Chapter 6, "Sampling and Testing," of this manual.
- When the contractor is to use bituminous material, check the maximum safe heating temperature recommended by the manufacturer.
- Inspect the contractor's equipment, and determine the method to be used for checking the bituminous adhesive temperature.

- Check the contractor's layout work to ensure correct alignment and spacing.
- Determine the proposed method of removing and disposing of residue from pavement recesses. Do not permit pavement removal to begin until the contractor has submitted the required documents.

4-8503 During the Course of Work

4-8503 During the Course of Work

During the work, do the following:

- Before the placing of pavement markers, ensure that pavement has cured for the specified time.
- Before applying adhesives, ensure the pavement is clean and the surface dry.
- Check pavement and air temperatures.
- Permit moving lane closures only when markers are placed using bituminous adhesive.
- When the contractor uses epoxy adhesive, which comes in two separate components, check the mixing for specification compliance. Ensure the proportions of the two components match the specifications. During the placing of pavement markers, observe the epoxy adhesive to ensure it is uniformly gray without black or white streaks. Even minor variations in the correct proportions of the two components will weaken the adhesive quality of epoxy.
- Verify that the application temperature of bituminous adhesive is within the specified range.
- Determine that the contractor meets the time requirements between mixing adhesive and placing pavement markers.
- Determine that the patterns and types of pavement markers are placed correctly in accordance with the typical details on the plans.
- After placement, determine that the pavement markers are not on longitudinal or transverse joints and that they are fully supported with adhesive.
- Also after placement, look for any missing or damaged pavement markers and document any rejections. Conduct and document an immediate night inspection to ensure the reflectivity of the installed material. If you encounter any problems, notify the contractor immediately for corrections.

4-8504 Measurement and Payment

4-8504 Measurement and Payment

Measure the pavement markers according to the units specified in the *Standard Specifications* and the special provisions. Record such measurement in the daily reports and the calculation sheets to support partial and final payments.

When large quantities of pavement markers will be placed, you may count the markers by keeping track of the number of boxes of markers used. Check this number against the theoretical number of markers to be placed.

Section 86 Signals, Lighting and Electrical Systems

Section 86 Signals, Lighting and Electrical Systems

4-8601 General

4-8601 General

Electrical work involving traffic signals, street lighting, illuminated signs, changeable message signs, electrical devices, and communication systems requires a specialized knowledge. The district should retain staff or train sufficient personnel to inspect this type of work.

Highway transportation signal and illumination systems are in a state of evolution, and changes in materials and specifications on successive projects are continually arising. Both the contractor and the resident engineer should be continually alert to this situation because even experienced electrical contractors may not be familiar with all of the work included in current specifications.

In most districts, construction has transportation electrical engineers to act as resident engineers on projects where electrical work is predominant. On projects where electrical work is not predominant, then personnel with electrical expertise can be made available for assistance to inspect electrical work.

In the smaller districts, transportation electrical engineers in the district traffic unit and highway electricians in the electrical maintenance unit are available for consultation. In recent years, the department has been using many more electrical systems in addition to just the traditional traffic signals and street lighting used in the past. These new systems include the following:

- Closed circuit television
- Changeable message signs
- Roadway weather information systems
- Microwave vehicle detection systems
- Other types of current technology devices

For the most part, the major changes consist in the equipment being used. The basic construction features are the same. For design intent and operational requirements, the resident engineer should pay particular attention to the special provisions and have close contact with the project designer and the operational end user.

4-8602 Before Work Begins

4-8602 Before Work Begins

Before work begins, do the following:

- Study the project plans, special provisions, and standard plan details thoroughly. Record on the plans any unusual items covered in the specifications but not shown on the plans. Additionally, in the margin of the plan sheet containing the pole schedule, it can be useful to indicate foundation sizes, bolt sizes, and bolt circles.

- Signal and lighting construction often involves many agreements and requires the coordination of activities with outside agencies and utilities. Contact the project engineer to obtain the resident engineer's pending file and to discuss the status of utilitity agreements and relocations. At the start of the project, review the resident engineer's pending file to become familiar with such agreements.

- To determine whether changes or revisions are needed, you may also need to review the project with the traffic signal maintenance electricians, the electrical design unit, and the district traffic unit.

- Although the district utilities coordinator coordinates with utility companies during project development, the resident engineer will be responsible for coordinating with outside agencies once the project has entered the construction phase. Provide advance notice and information to the utilities and others so they can plan their work in an orderly manner. When necessary, notices should include a request for electrical energy and telephone interconnection lines. Either the resident engineer or the district utility coordinator should submit an application to the utility company.

- Advise utility company representatives of clearances necessary to accomplish the work. Insufficient overhead clearance requiring utility relocation is the most common obstruction overlooked on contracts that cover improvements to existing highways. To avoid delays, determine any necessary relocations or adjustments as early as possible. Review the project with the contractor to determine the locations where cranes, pile-driving equipment, or other equipment will be used. If utility facilities must be relocated because of the proposed work, refer this situation to the district right-of-way unit. Also, if overhead wires for temporary lighting or signals encroach on private property, refer this situation to the district right of way unit.

- Determine the contractor's schedule of operations so arrangements can be made to maintain existing signals and street lighting.

- Section 86-1.03, "Cost Break-Down," of the *Standard Specifications* provides for a cost breakdown of each lump sum unit of electrical work. Check the contractor's breakdown for completeness and accuracy. Before approving the submittal, call to the contractor's attention any unbalanced unit costs and require their correction. This breakdown can be used for progress payments and also as a cost basis for contract change orders. Before making partial payments on lump sum electrical items, approve the cost breakdown.

- Obtain a list of equipment and materials that the contractor proposes to install, as required by Section 86-1.04, "Equipment List and Drawings," of the *Standard Specifications*. To prevent omissions or irregularities, the resident engineer must check the required list of materials, and the electrical design unit must then recheck the list. For compliance with the contract, ensure the materials are identified with the manufacturers' names, catalog numbers, and other appropriate listings.

- Before any excavation near a known underground utility, ensure the contractor has called the regional notification center. (Reference the "Obstruction" section in your special provisions.) Caltrans is not affiliated with any utility notification centers. Therefore, our facilities cannot be located in this manner. Contact the local electrical maintenance region manager for help in locating Caltrans facilities. For facilities within Caltrans right-of-way, such as irrigation systems, signal and lighting systems, and traffic monitoring stations, you may obtain and verify the lastest utility "as-built" from the electrical maintenance unit .

- Promptly order state-furnished materials listed in the special provisions, such as signs, lamps, light emitting diodes (LEDs), signal controllers, cabinets, and other equipment. Also, to control the pickup and delivery of these materials to the contractor, contact all the necessary parties.

4-8602A Materials

For materials, do the following:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists electrical materials.
- To determine which materials are assigned for release at the job site, review Form TL-0028, "Notice of Material to Be Inspected." Also, ensure the contractor delivers with these materials the necessary certificates of compliance (including compliance with Buy America requirements) and test results to the site. You must release or reject the materials in accordance with Chapter 6, "Sampling and Testing," of the *Construction Manual* (manual).
- As stated in Section 6-1.05, "Trade Names and Alternatives," of the *Standard Specifications*, the contractor may request permission in writing to make a substitution for a product specified if the substitution is of equal quality and suitability.
- The Office of Materials Engineering and Testing Services, the Office of Structure Design, and the electrical design unit have personnel with technical knowledge to evaluate the suitability of properties, including the electrical characteristics of the items involved. Consult these personnel and give adequate weight to their recommendations as to the acceptability of a proposed substitute.
- The resident engineer must recommend approval or denial of a substitute. Under no circumstances must the supplier or contractor bypass the resident engineer by negotiating with other functions for proposed substitutes on projects under contract.
- Any substitution for a specified product is a change in specifications and must be made by a contract change order.
- For any electrical materials that the plans indicate will be salvaged, checked the condition of the materials before the contractor arrives on the job site. To document the materials' condition, take photographs. For more information on salvage materials, see Section 3-403B (4), "Surplus and Salvaged Material," of this manual.

4-8603 During the Course of Work

During the work, do the following:

- During construction, ensure the use of adequate warnings and safeguards in the form of signs, lights, and barricades. Jacking pits or foundation holes where pedestrians may walk must be covered with adequately braced plywood or an equivalent.
- Inspect underground work while it is actually underway because when once such work is complete, an inspection cannot be done. Include in your inspection the placing of conduit and the excavation for and the placing of concrete for signal standards, electrolier bases, and similar items.

4-8603 During the Course of Work

- If communication cables or utility pipe lines are encountered, contact a representative of the utility owner.
- Continuously record all changes into the as-built plans.

4-8603A Foundations

For foundations, do the following:

- The location of electroliers near offramps is related directly to the gore on offramps and to the lane width of on ramps. Keep this fact in mind if it is necessary to revise the locations of the electroliers. For the location of freeway luminaires, see Figure 9-25, "Freeway Lighting," of the *Traffic Manual*. Also, pay particular attention to the foundation locations shown on Sheet ES-11, "Signal, Lighting and Electrical Systems-Foundation Installations," of the *Standard Plans*.
- Concrete for electrolier and signal foundations is often placed without forms against the excavation. The resulting rough block of concrete is functionally satisfactory. However, ensure the contractor forms and finishes the exposed part of the footing as specified. To ensure the proper operation of breakaway or slip bases, the top of the foundation must not be higher than the height shown on the plans. Also, the conduit must be below the slip plane. For various standards and foundations as they relate to monolithic foundation pours and grout pads, pay particular attention to the details in the *Standard Plans*.
- During concrete placement operations, ensure that anchor bolts are securely held in the proper position and that the proper size anchor bolts and the correct bolt circle are used. Determine that bar reinforcing steel, when required, is securely fastened and has the required clearances. Verify that the foundation excavation is the proper size and depth, and ensure the specified concrete is used.

4-8603B Standards

For standards, do the following:

- Where areas behind asphalt concrete dikes are filled with dirt to the level of the top of the dikes, ensure the contractor also sets standards and pull boxes to the top of the dikes.
- Before accepting a project, ensure that the grounding of standards complies with specified methods.
- When laying out standards, ensure no obstructions exist that will prevent vehicular or pedestrian traffic from seeing vehicular or pedestrian signal faces. Standards with push buttons must be no more than 1.5 m from crosswalks, and the push buttons must be on the side of the standard nearest the crosswalk.
- Upon setting the standards, ensure that washers are used on both sides of the slip base plate and between the bottom and top slip base plates and that, before erecting the standard, all leveling and top nuts are properly torqued. When using slip base inserts, assemble the top and bottom plates and torque the bolts before placing the standard on the top plate of the slip base assembly.
- For the location of standards with slip bases or slip base inserts, refer to Section 9-11.4, "Slip Bases," of the *Traffic Manual*. If the exception areas as listed in Section 9-11.4 apply to a planned slip base standard, contact the designer about a contract change order.

- Ensure electroliers on structures are located with regard to bridge rail plans so that anchor bolts may be placed where the bridge rail gap will be. Ideally, keep electrolier bases at least five feet from expansion joints. This practice prevents extra stresses from the electrolier at these critical structural locations.

- A slight rake of the standard, about three degrees from the roadway, prevents the impression that the standard is leaning toward the highway. The standard can be raked by plumbing the side of the tapered standard from the road.

4-8603C Conduit

In general, do the following for conduit:

- For permitted or required methods for placing conduit, check the special provisions. Ensure that the trench backfill is compacted 90 to 95 percent relative compaction depending upon the location. Also, ensure that the backfill is properly placed around pull boxes and conduit.

- Any conduit projecting from solid concrete is likely to be broken or bent when forms are removed or backfilling equipment operates close to the structure. Therefore, even if the conduit will be used in the near future, ensure that when it is embedded in concrete structures, it is plugged flush as shown on the plans. To assist in finding the location of the conduit in the future, mark the concrete and indicate the conduit's location on the as-built plans.

- Ensure that expansion joints are placed in the conduit where it passes through expansion joints in concrete structures. To ensure the joints operate correctly, check the proper type and placement of them.

- Ensure conduit terminating in a pull box extends into the box in a manner that will keep the box as clear as possible for making connections and placing ballasts. Check all conduit for proper bonding and proper connections.

- When conduit is being placed across existing roadways, ensure one of several common methods is used. These methods include directional boring, air drill, fishtail bit, water, hydraulic jack, compressed air, two diameters of conduit(one within the other), and trenching across the pavement. For some of these methods, take the following conditions into account:

    1. Directional boring uses a locator and electronics that are in the boring head. The operator can control the direction and depth of the boring head. Using this method of boring allows the conduits to be placed in precise locations. It is possible to bore across a roadway and come out within millimeters of the planned location.

    2. The air drill and fishtail bit should be used with the minimum amount of water possible. Too much water tends to saturate the grade and wash out large voids that can cause the road surface to collapse and the pipe to drop excessively.

    3. If the air drill and fishtail bit are used in sandy soil, the water and sand will tend to bind the conduit. Common soap powder or detergent may overcome this condition. If not, the use of rotary mud and water will seal off the sand and lubricate the conduit. However, if rotary mud is used, ensure that before the backfilling of the drill pit, the contractor flushes the mud from the pipe and then removes all the mud from the drill pit. Failure to thoroughly remove mud results in a spongy backfill.

4. When a hydraulic jack and compressed air are used to push conduit under pavement through sand, the smaller diameter pipe carries a jet of air. To prevent removing too much sand from under the road and so leaving large voids, ensure the contractor restricts the amount of air used to jet out sandy material.

- In bridges, ensure the conduit riser is out of the way of utilities or manholes in the sidewalk.
- Ensure that conduit placed from a light fixture to a pull box above it terminates in the pull box with sufficient clearance from the walls to permit the placing of the specified sealing fitting without interference from the box cover or transformer.

4-8603C (1) Metal Conduit

When a conduit is properly connected, all threads are covered by the coupling and the ends of the conduit are butted tightly together. If threads are exposed, generally either the connection is not tight or the threads are crossed in the coupling. Conduit threads are not tapered. Either observe the joining of conduit during placement or test with a wrench to ensure the joints are tight, but not over tight. Over tightening will cause belling of the end of the conduit inside the coupling and can cause damage to the conductors during installation. If the conduit is not in a straight line when being assembled, frequently the joints do not butt together even when tightened with a wrench. Ensure that conduit ends are square and field cuts are made with a pipe cutter as specified.

Ensure that field bends are not made too close to a coupling. Stress at a coupling frequently causes the conduit to fracture at the threads. This fracture may be covered by the coupling and not be discernible at the time, but the fracture may give trouble at a later date.

Ensure the contractor uses only approved tools to make field bends. The bends should never be made on the back of a truck, under a railroad track, or around a tree. A hydraulic bender is best, while ensuring that the bend is not too sharp. To make a smooth, 90-degree bend without kinks or flat places, three to four settings of the hydraulic shoe are necessary.

Check the ends of factory reamed conduit for burrs, and ensure field cuts are always reamed. Prohibit threadless connectors for conduit because they do not have sufficient mechanical strength.

4-8603C (2) Plastic Conduit

During installation, plastic conduit, like polyvinyl chloride water pipes and fittings, requires special handling. After installation, ensure the contractor takes special precautions to prevent damage to the conduit when installing pull box markers, sign posts, and guardrail.

To pull conductor wire through plastic conduit, ensure the contractor uses a soft nylon pull rope.

To obtain good, nonthreaded joints for plastic conduit, ensure the contractor takes special care to clean the ends of the pipe and use the right amount of the proper solvent cement.

4-8603D Pull Boxes

For pull boxes, do the following:

- As required under the contract, ensure that pull boxes are installed in conduit runs and adjacent to operating units; however, prohibit pull boxes from being installed within the boundaries of a wheel chair ramp.
- Ensure pull boxes are placed away from any expansion joint. If pull boxes are improperly shown on the plan, provide an alternate location.
- Ensure that in surfaced areas, behind portland cement concrete curbs or in sidewalks, the top of the box is even with the surrounding surface—never depressed. On unpaved slopes, ensure the pull boxes are kept out of depressions so as not to collect water. Pull boxes must be set over a layer of gravel that will provide a means of draining water away from the electrical components within.
- In unpaved, relatively flat areas, ensure the contractor places pull boxes about 30 mm higher than the average surrounding elevation.
- When final grades of surrounding features under construction are not accurately established, it is sometimes necessary to set the pull boxes temporarily low and raise them to final grade as curbs and sidewalks are built.
- Before a bridge deck is poured, if the formed type of pull box is to be used, ensure the contractor first places properly dimensioned wooden pull box templates at pull box locations.
- To provide a drain hole within structures, ensure the contractor places a 19 mm pipe or plastic hose through a hole in the form at the lowest point of the pull box location.
- To determine that the covers are properly inscribed, perform a final check of the pull boxes.
- In illumination and signal work, the voltages employed range from a low of milli-volts for pedestrian push button and detector loops to a high of 5,000 volts for highway lighting circuits. Ensure these voltages are isolated from one another.
- Prohibit the splicing of a pedestrian push button common into a signal or street light common, and never permit a signal conductor to enter a pull box containing a high voltage street lighting circuit. The possibility of a crossover, although remote, is nevertheless present.
- If signal modification work requires the detectors to be disconnected or the signal turned off, give the signal maintenance superintendent prior notice. When necessary, a Caltrans electrician will place the signal temporarily on recall. If the signal must be shut down completely for a time, give the appropriate law enforcement agency 24 hours notice to provide police protection and traffic control.

4-8603E Conductors

For conductors, do the following:

- One conductor is needed for each separate signal section, plus one neutral and three spares in a pole. If one R, Y, G head is to be installed on the pole, then 3+l+3 or 7 conductors are needed. An additional R, Y, G facing at right angle to the other head on the same pole requires three more conductors, or a total of ten.

Arrow lenses generally need an additional conductor each. If questions arise concerning conductor color coding, size, or installation method, consult with the district traffic unit or the electrical maintenance unit.

- Despite the fact that more than one field conductor may go on the same terminal at the controller cabinet, do not allow these conductors to be spliced at a pull box and a single conductor to be run to the controller cabinet. Individual leads are needed so that testing can be done at the controller cabinet. (Only the neutrals, pedestrian push button, and lighting conductors can be spliced.)
- On 9.1 m poles, the best job can often be obtained by installing the luminaire conductors inside the pole before erection and then splicing to leads in the pull box after erection. Luminaires and mast arm signals can also be attached to the poles before raising. To reach from the pull box to the terminal block on the standard without additional splices, ensure the contractor leaves sufficient slack conductor in the pull box. Splices are only permitted at the locations stated in the specifications. Checking for tight connections and splices in all wiring is extremely important.
- When pulling conductors, a wire trailer is desirable. Ensure the contractor pulls conductors from the reels in such a manner that traffic will not run over the conductors and that pedestrians will not walk on them. Both events can cause damage to the conductors. To prevent damage to small conductors by overpulling, the *Standard Specifications* require that the conductor be pulled by hand. Do not permit the use of winches, trucks, or other mechanical aids. The special provisions may permit power pulling of large conductors. If so, ensure tension measuring devices are used in accordance with the manufacturer's recommendations.
- Before pulling conductors into conduits, ensure proper planning and careful measuring to avoid the slipping of one conductor past another in the conduit. To prevent any damage to insulation that slipping causes, ensure the contractor feeds the various conductors into the conduit in a sequence determined by the length of the individual runs and the use of lubricant as specified. If additional conductors are being installed in an existing conduit, the *Standard Specifications* require that all of the conductors be removed, the conduit cleaned and mandrelled, and the conductors be pulled into the conduit as a unit. Prohibit the slipping of added conductors past existing ones.
- To prevent cutting the conduit, ensure the contractor takes extra care when pulling conductor in plastic conduit. Bushings or pulling bells are required on the ends of conduits.
- Ensure conductors are tagged or labeled according to the specifications. Prohibit the painting of conductors or the use of colored tape on the ends of conductors to obtain the specified insulation colors. The *Standard Specifications* permit the use of phase taping on conductors size 2 and larger.
- Ensure conductor splices are made as shown on the standard detail sheets and as specified. All splices must be tight and waterproof. Conductors size 8 and smaller must be soldered.
- Ensure leads to transformers are spliced as shown on the detail sheet and as specified. A ground clamp fastened to one of the secondary terminals makes an ideal connection for the grounding bond. Ensure transformers are never picked up by the leads.

4-8603F Vehicle Detectors

Along with the controller unit, check the portion of vehicle detectors installed in the controller cabinet. When testing the completed system, include the entire detector system. During installation, the following are some of the duties to perform:

- Verify the loops are laid out in the proper locations.
- Before installing inductive loop detectors, ensure the contractor washes, blows out, and dries all slots cut in pavement. Ensure residue from saw cutting operations is vacumned from the roadway and disposed of off of the project.
- Ensure that detector loops contain the required conductor type and number of turns and are wound in the specified direction.
- Ensure the contractor splices conductors only at locations permitted under the contract. All splices must be soldered.
- Ensure the contractor places loop wire in the slot with a tool that will not damage the wire's insulation.
- Ensure that loop wires between the loop and adjacent pull box are twisted together as required.
- Observe the placement of loop sealant to ensure the contractor uses the specified material and method of placement.
- When final splicing between loops and lead-in cable is approved, advise the contractor.
- In pull boxes and at the cabinet, ensure the contractor identifies and bands the conductors as specified.

4-8603G Soffit and Wall Luminaires

Ensure soffit lights are installed with the hinge side toward the curb, or as shown on the plans. Also, before pouring concrete around soffits, ensure they are securely fastened. The danger of floating always exists during the pour, and workers frequently will rotate them to place steel or forms. To prevent damaging conduit joints, ensure that conduit between soffit lights is secured and then also supported with concrete blocks. Prohibit standing on conduits or piling material on them.

4-8603H Falsework Lighting

Require the contractor to submit a falsework lighting plan for review and approval by the resident engineer. Ensure the plan conforms to the specifications. Prohibit the contractor from proceeding with work requiring falsework lighting until the plan's approval. The contractor must provide temporary electricity through arrangements with the utility company.

4-8603I Testing

Before completing the work, the contractor must test all traffic signal and lighting circuits in the presence of the resident engineer. The tests are outlined in Section 86-2.14, "Testing," of the *Standard Specifications*. The following tests are to be performed:

- Continuity
- Grounds
- Insulation resistance

- Operational tests
- High voltage tests

The maintenance highway electrician, traffic operations engineers, or construction electrical engineers will aid the resident engineer in observing the test results.

The continuity and test for grounds may be made with an ohmmeter, buzzer and battery combination, or other similar device.

The insulation resistance test is usually made with a megohmmeter, which is a small hand-operated or battery-operated generator, which usually generates about 500 volts. However, prohibit megohmmeter tests on magnetometer sensing elements.

Ensure the contractor tests each circuit of a signal system by applying voltage to it and verifying the lights are operating.

The operational tests consist of a five-day continuous satisfactory operation test for traffic signals and two consecutive nights for lighting systems. If the operation test fails during the five days of operation, repairs will be made and the test will be restarted. If state-furnished material fails, do not restart the test. Once the state-furnished material has been repaired, the test can continue to completion.

4-8603J Completing the Project

To complete the project, do the following:

- Before new work is opened to traffic, ensure all traffic control devices are in place and working properly.
- Until signals are placed in operation, ensure the signal heads are turned away from traffic and completely covered with cardboard boxes or other suitable material.
- Never put into operation a completed traffic signal on a Friday or any day preceding a legal holiday. Also, before the signal is turned on, the traffic operations engineer must be present to adjust the timing in the controller.
- For correct light distribution and minimum glare from luminaires, ensure the contractor positions the luminaires as nearly parallel to the roadway as possible.
- Ensure the contractor has properly installed all signing and striping items.
- To ensure that items that might possibly be overlooked when accepting the work are completed in all their details, prepare for reference a printed checklist similar to Example 4-86.1, “Example Checklist,” shown at the end of this section. This checklist should include reminders about the proper positioning of louvers and heads, the placing of the cap on the top of light standards, final painting and cleanup, and similar details.
- Give two weeks notice of the proposed turn-on of the signal system to district traffic operations, public information, signal maintenance, the local fire department, the police department, and schools.

4-8603K Forms

The resident engineer must ensure that all necessary forms are completed or placed in the cabinet. These forms include but are not necessarily limited to the following:

- Notification to the appropriate district units of dates when electrical facilities were placed in service or removed from service.

- Notification to the district electrical billing coordinator by submittal of the completed Utility Service Request Form. This request provides the necessary information for the billing, inventory items, and turn-on and turn-off data.
- As-built plan copies to the electrical maintenance unit and to the district traffic unit, the original as-built plans to the district construction office, and one set of field as-built plans and a copy of the special provisions in the controller cabinet.

4-8603L Guaranties

Resident engineers must take the following actions on contracts that include a guaranty for work performed:

- Ensure a notice is installed in each controller cabinet with the following information:
  1. Name, address, and phone number of the contractor, including the phone number of the individual to be notified of any action regarding the guaranty. The contractor referred to here is the one who signed the original guaranty.
  2. Name, address, and phone number of the signal equipment vendor.
  3. Date of the contract acceptance.
  4. Date the guaranty expires.
- Before contract completion, ensure the district maintenance unit is provided with two sets of contract special provisions and project plans.
- Advise the district maintenance unit as soon as possible of the date of contract acceptance.

4-8604 Measurement and Payment

4-8604 Measurement and Payment

During the course of the project, ensure progress payments are made to the contractor for work completed during the estimate period. The estimate period is from the 21st of one month through the 20th of the next month. For progress payment purposes, keep records of the work completed in each period. One way of keeping track of such work is to mark on a set of contract plans with a felt pen using a different color for different periods. At the 20th of the month, total all the work units performed during that period. Then, using the cost breakdown furnished at the beginning of the project, calculate the value of work completed in this period. To make this a very simple calculation, you can establish a spreadsheet.

On many projects, traffic signal and lighting standards, traffic signal equipment, and electrical hardware items are listed as eligible for payment as material on hand (MOH). On a monthly basis, check the contractor's submittials for MOH, and verify that materials incorporated into the work have been removed from the MOH submittial.

Verify all the bid items and review the special provisions as to the method of payments and the condition of the item payments.

Example 4-86.1 Example Checklist

(check off if satisfactory)

1. Pull boxes to grade _____
2. Crosswalks correct _____
3. WALK-DON'T WALK heads _____
4. Signal Heads louvered properly _____
5. Vehicle detector in proper lane _____
6. Pull boxes correctly labeled _____
7. Correct pedestrian signs at push buttons _____
8. Heads correctly positioned _____
9. Heads checked for brilliance _____
10. Base bolts of poles checked for tightness _____
11. Poles checked for proper painting _____
12. Ground bushings and connections tight _____
13. Proper shield of telephone interconnect in controller box _____
14. Tightness of lugs in controller cabinet _____
15. Guarantees _____

Inspected by _____

Comments:

Section 88 Engineering Fabrics

Section 88 Engineering Fabrics

4-8801 General

4-8801 General

Section 88, "Engineering Fabrics," of the *Standard Specifications* provides material requirements for three types of engineering fabrics. Pavement reinforcing fabric (PRF) is used as an interlayer in asphalt concrete overlays to minimize surface water infiltration and to minimize reflective cracking through the overlay. Filter fabric is placed between a freely draining aggregate and soil to allow passage of water and to retain fine soil particles. Rock slope protection (RSP) fabric serves the same purpose. As with filter fabric, RSP is placed between rock slope protection and the underlying foundation material.

Section 39, "Asphalt Concrete," of the *Standard Specifications* includes requirements for placing PRF. Section 68, "Subsurface Drains," of the *Standard Specifications*, provides requirements for placing filter fabric used with underdrains and edge drains. Specifications for placing RSP fabric are in Section 72, "Slope Protection," of the *Standard Specifications*.

4-8802 Before Work Begins

4-8802 Before Work Begins

Before work begins, perform the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists engineering fabrics.
- Remind the contractor to ensure that samples of filter fabric and RSP fabric that are treated with ultraviolet radiation (UV) protection are submitted to the Office of Materials Engineering and Testing Services (METS) at least 45 days before use.

4-8803 During the Course of Work

4-8803 During the Course of Work

Once work begins, take the following steps:

- Do not permit the use of engineering fabrics until certificates of compliance covering the material have been submitted.
- Ensure that UV treated fabric has been inspected by METS.
- Order the removal and replacement of filter fabric that has not been treated with UV protection and that has been exposed for more than 72 hours.

4-8804 Measurement and Payment

4-8804 Measurement and Payment

Measurement and payment clauses are included in the *Standard Specification* sections or special provisions providing for placement of the various types of engineering fabrics.

Section 90 Portland Cement Concrete

Section 90 Portland Cement Concrete

4-9001 General

4-9001 General

This section covers portland cement concrete. The *Standard Specifications* designates concrete with the following descriptions:

- Class
- Cement content
- Compressive strength
- Minor concrete

This section does not cover specialty concrete such as polyester concrete and fast-setting hydraulic cement concrete. The resident engineer should contact the Division of Construction, the Office of Materials Engineering and Testing Services (METS), and the district materials engineer for guidance on specialty concrete.

For a complete discussion on various items using concrete, refer to Section 40, "Portland Cement Concrete Pavement," Section 50, "Prestressing Concrete," Section 51, "Concrete Structures," Section 72, "Slope Protection," and Section 73, "Concrete Curbs and Sidewalks," among other sections of the *Standard Specifications*. Also refer to the corresponding Section 4-40, Section 4-51, Section 4-72, and Section 4-73 of the *Construction Manual* (manual). You can also obtain additional information on portland cement concrete from the Office of Structure Construction's *Concrete Technology Manual* and the *Bridge Construction Records and Procedures Manual*.

4-9002 Before Work Begins

4-9002 Before Work Begins

The *Standard Specifications* requires the contractor to determine the mix proportions for all concrete except for pavement concrete. To determine the various types of concrete that will be required, review the contract provisions. Pay particular attention to concrete designations such as "class," "cement content," "compressive strength," or "minor concrete." Also, note the type of cement to be used and any special requirements for the aggregate and use of admixtures. Make a list of the various mix designs the contractor will need to submit and a note of the concrete that needs to be prequalified before use. For your review, encourage the contractor to submit the mix designs early in the project.

Review the mix designs for compliance with the special provisions, *Standard Specifications*, and contract plans, or forward the mix designs to the district materials unit for review. Before the contractor places any concrete, the district materials unit will need an approved copy of the mix design for unit's plant inspectors. If the concrete is designated by compressive strength, obtain certified test data or trial batch test results in advance of the concrete's use to avoid delays. Review the data and results for contract compliance.

Review the current certifications of Caltrans field staff who will perform the acceptance testing of the concrete. Staff must be certified in the following:

- California Test 125, "Sampling Highway Materials and Products Used in the Roadway Structural Section"
- California Test 518, "Unit Weight of Fresh Concrete"
- California Test 523, "Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)"
- California Test 533, "Test for Ball Penetration in Fresh Portland Cement Concrete"
- California Test 540, "Making, Handling, and Storing Concrete Compressive Test Specimens in the Field"
- American Society for Testing and Materials (ASTM) C172, "Standard Practice for Sampling Freshly Mixed Concrete"

4-9002A Materials

Before work begins, do the following for materials:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which lists concrete materials such as cement, fly ash, and aggregate.
- Cement is normally accepted on the basis of a Certificate of Compliance; therefore, initial samples are not taken. If special requirements exist for the cement or if it is obtained from an unusual source, consider initial testing. For more details about cement sampling and testing, see Chapter 6, "Sampling and Testing," of this manual.
- Verify that the aggregate source complies with the Surface Mining and Reclamation Act of 1975. Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. This list can be obtained from the Division of Construction or at the Department of Conservation's web site at http://www.consrv.ca.gov/omr/SMARA/3098-list.
- Verify with the district materials unit that current tests have been performed on aggregates as listed in Section 6-1, "Sample Types and Frequencies," of this manual.
- You may omit initial sampling and testing if the specified aggregate is currently being used on another Caltrans contract with acceptable testing results. In the daily report, record any reasons for not taking initial samples.
- If current tests have not been performed, obtain initial samples of aggregate to be used and have them tested for all specified attributes. For reference, see the table in Section 6-1 of this manual. You can prevent unnecessary expense and delay if you send samples that can be made to conform to the specification grading. Indicate whether oversized material will be crushed or if any special blends are contemplated.

4-9002B Aggregate Gradings

From the contractor, obtain in writing the primary aggregate nominal sizes to be furnished. The Office of Structure Construction's *Concrete Technology Manual* has examples on how to check the contractor's proposed gradings. In addition, the Office

of Structure Construction's web site has a spreadsheet available to assist in this review. When the requirement for furnishing the proposed gradation is unnecessary for the type or amount of concrete work, advise the contractor and note such a decision in the daily report.

4-9002C Admixtures

Before work begins, do the following for admixtures:

- Admixtures must be of a type allowed by the *Standard Specifications* or special provisions. In addition, they must be on the approved list of admixtures maintained by METS. You can access this list through the Engineering Service Center web site at:
  http://www.dot.ca.gov/hq/esc/approved_products_list/AdmixList.html
  Admixtures do not require initial tests if they are currently approved and a Certificate of Compliance is furnished.

- If you choose to test admixtures before using them, obtain samples of liquid admixtures and place them in clean liter cans or plastic bottles. Sample powdered admixtures in dry form (not after mixing with water on the job). Friction top cans or plastic bags similar to those used to sample cement are satisfactory.

- Send a completed Form TL-0101, "Sample Identification Card," with the sample. Include the manufacturer's lot number represented by the sample and the name of the product, including any prefix or suffix. Also, show the class of work for which the sample will be used, such as concrete pavement or prestressed concrete. The laboratory needs this information to determine the suitability and amount of admixture for use. For sampling admixtures, refer to California Test 125, "Sampling Highway Materials and Products Used in the Roadway Structural Sections."

- Air-entraining agents need not be sampled initially if the contractor presents evidence that the product meets specifications.

- Even when a contract specifically allows or requires admixtures, determine the rate of such use through consultation with METS for each specific product other than air-entraining agents.

- Section 100, "Concrete Materials and Mixing," of the *Bridge Construction Records and Procedures Manual* contains detailed information under Memo 100-4.0, "Admixtures for Portland Cement Concrete." Before making a final decision on the use of admixtures, review this data.

4-9002D Proportioning

The following is primarily a guide for the Caltrans plant inspector, but anyone who needs to verify that plant operations are contract compliant can also use this guide:

- Ensure that storage is as specified in the aggregate storage areas. When various sizes are to be stored separately, require physical separation, either by space between stockpiles or some type of wall that will provide positive separation. Pay particular attention to the method used to prevent contamination of the aggregate. In general, a hard surface, as specified in Section 90-5.01, "Storage of Aggregates," of the *Standard Specifications*, is required for storage of the aggregate stockpile.

- Determine whether the stockpiled aggregate is similar to material upon which the design was based.

- As a part of California Test 109, “Test for Weighing and Measuring Devices,” the district weights and measures coordinator will have completed a safety inspection of the plant facilities frequented by the Caltrans plant inspector for the plant in question. Review the sampling facilities to ensure they will deliver a sample in a safe manner that accurately represents the material. For sampling requirements, refer to California Test 125, “Sampling Highway Materials and Products Used in the Roadway Structural Sections.”

- Before use for Caltrans projects, the plant scales and meters must have a current Form CEM-4204, “California Test 109 Sticker.” The district weights and measures coordinator administers this test. Examine the plant to determine whether weighing equipment matches the testing results. Ensure that scales and meters have been sealed or tested as required. Request from the district weights and measures coordinator the material plant approval report. For additional details, see Section 3-903E, “Weighing and Metering Procedures,” of this manual.

  The county sealer of weights and measures tests and seals weighing and metering devices at commercial plants. During the sealing of these plants, the county sealer does not test the interlocks. Therefore, even though the county sealer has sealed the scales and meters, the interlocks must be tested and approved as for noncommercial plants in accordance with California Test 109, “Test for Weighing and Measuring Devices.”

- Ensure that cement can be kept separate from the aggregate until discharged into the mixer.

- Ensure the plant or mixer has the specified automatic timing device. When automatic batching is used, the timing device must be interlocked with the mixer discharge mechanism as specified.

- Examine mixers to ensure that blades are not worn beyond specified tolerances. See that mixers are free of accumulations of hard concrete or mortar.

- Ensure truck mixers have the required metal plates containing the specified information. Also, check truck mixers to ensure they have the specified revolution counters.

- Ensure the contractor will not use equipment with aluminum or magnesium components if these components will contact plastic concrete.

- In addition to the above, check the following when the concrete to be produced is for portland cement concrete pavement:

  1. If specified, ensure the plant has a moisture meter. Be aware that any moisture determination is calculated “as a percent of the dry aggregate.” Commonly used moisture meters measure the total moisture in the material being tested. However, specifications for moisture content in the fine aggregate and batch proportion calculations are based on the free moisture rather than the total moisture content. Therefore, ensure the moisture meter is calibrated for the absorption of the aggregate upon which it is to be used.

  2. Ensure the system contains the specified proportioning interlocks. Determine whether the proportioning system is capable of full automatic operation.

  3. Determine whether the equipment is capable of accepting changes in proportions or sequence of weighing individual sizes without delay.

4-9002E Curing Concrete

Review the various methods of curing concrete contained in Section 90-7, "Curing Concrete," in the *Standard Specifications*, and discuss with the contractor the proposed methods. Before concrete work begins, ensure the contractor has the required curing materials on-site. Such materials include rugs, a water supply, or a properly inspected curing compound.

The curing compound must be of the type specified by the special provisions, *Standard Specifications*, or both. Before the compound's use, ensure METS inspects and releases the curing compound. If more than one year has passed since the METS inspection, ensure that before use the curing compound is sampled and tested again.

4-9002F Compressive Strength

When concrete is designated by compressive strength, the contractor must prequalify the concrete before its use as a compressive strength concrete. For additional details, see both Section 6-305D (2), "Trial Batches," of this manual and also the *Bridge Construction Records and Procedures Manual*.

4-9002G Minor Concrete

When minor concrete is to be used, obtain from the contractor the proposed combined aggregate grading. In general, for minor concrete, you may approve any gradation that produces concrete that meets all other specified qualities.

4-9002H Design of Mix

Concrete mixes should be designed with proportions that will produce concrete with the following qualities:

- The stiffest consistency (lowest penetration) that can be placed efficiently
- Adequate mortar content to provide the required finish
- The lowest water demand consistent with the aggregate specified

4-9002H (1) Selecting Proportions

The following are guidelines to design a workable mix of concrete:

4-9002H (1a) Cement Content

For concrete designated by class, the cement content is fixed, and the design must be based on the specified amount. For concrete designated by cement content, determine whether the amount of cement applies to the source the contractor selected, and base the design on a cement content that will produce the quality the designer anticipated. For more details about concrete used for pavement, see Section 4-40, "Portland Cement Concrete Pavement," of this manual.

4-9002H (1b) Water Content

The quantity of water per unit of concrete required to produce a mix of the desired consistency is influenced by the maximum size, particle shape, and grading of the aggregate and by the admixtures used. The quantity of water remains relatively unaffected by the quantity of cement.

The quantities of water shown in the Table 4-90.1, "Estimate of Free Water Content for Initial Design" should apply with sufficient accuracy for preliminary estimates or proportions. The values are near the maximal, which should be expected for fairly well shaped but angular aggregate graded within the limits

of the specification. Without specific knowledge to the contrary for the materials being considered, use the data in the table to determine the free water content of the initial mix designs.

The following table shows estimated free water content for different ranges of consistency (penetration) and maximum aggregate size. The free water content for crushed aggregate can be estimated at the upper limit of the listed water contents and rounded aggregates can be estimated at the lower limit of free water content. Additional cementitious material must be ordered, if the free water content exceeds the amount specified in Section 90-6.06 of the *Standard Specifications*. Notify the contractor of any ordered increase in the cementitious material. If the contractor elects to use a water-reducing agent, ensure that the proposed admixture is on METS' list of approved brands. Testing of the mix desgin must include the proposed admixtures to ensure that the desired concrete properties, such as strength, and air content are attained.

Table 4-90.1 Estimate of Free Water Content for Initial Design

Penetration (mm)	Free Water, (kg/m^3)		
	Max. Size Aggregate 25 mm	Max. Size Aggregate 37.5 mm	Max. Size Aggregate 63 mm
12.5 mm to 25 mm 37 mm to 50 mm 75 mm to 90 mm	180 to 190 190 to 200 210 to 220	160 to 170 170 to 185 185 to 195	140 to 155 160 to 170 165 to 180
Approximate amount of entrapped air in nonair-entrained concrete, percent	2	1	0.4

If the contractor elects to use a water-reducing agent, the admixture must be tested to ensure that it meets the criteria specified for drying shrinkage and strength. See Section 4-9002C, "Admixtures," earlier in this section.

4-9002H (1c) Combined Grading of Aggregate

In considering the use of 37.5 mm maximum size aggregate, the recommended procedure in selecting the fine aggregate content is to start with the median value of the percent passing the 4.75 mm sieve (38 percent) and then adjust this value in accordance with the following criteria:

If the fine aggregate is close to the fine side of the specification limits for the various sieve sizes, use two percentage points less fine aggregate in the mix.

If the fine aggregate is close to the coarse side of the specification limits for the various sieve sizes, use two percentage points more fine aggregate in the mix. This was done in the following Example 4-90.1, "Sieve Analysis and Combined Grading for Portland Cement Concrete, 37.5 mm Maximum."

If the maximum size of aggregate is 63 mm, use two percentage points less fine aggregate.

If the coarse aggregate is largely crushed or is naturally very angular in shape, use two percentage points more fine aggregate.

If the cement content is 350 kg or more per cubic meter, use two percentage points less fine aggregate.

These recommended adjustments may be compensating or cumulative adjustments.

To select the percentage of aggregate of 25 mm x 4.75 mm primary size, start with the percentage of aggregate necessary to meet approximately the middle of the specifications for the 19 mm sieve (60 percent). The percentage of fine aggregate is then subtracted (60 - 40 = 20), giving a figure of 20 percent for the 25 mm x 4.75 mm aggregate. The remainder of the mix is made up of 37.5 mm x 19 mm aggregate (100 - 60 = 40).

If the maximum aggregate size is 63 mm, determine the percentages of both primary coarse aggregate sizes, computing the percentage of aggregate necessary to meet approximately the middle of the specification limits on the 37.5 mm sieve. Make up the remainder of the mix with 63 mm x 37.5 mm aggregate.

Check the grading of the combined mix against the specification limits for the various intermediate screens. Also analyze the grading of the combined mix based on experience and judgment.

You may tabulate the gradations to be used as shown in columns (b), (d), and (f) in Example 4-90.1, "Sieve Analysis and Combined Grading for Portland Cement Concrete, 37.5 mm Maximum" in these instructions.

4-9002H (2) Computations for Mix Design

In designing a concrete mix, you need an understanding of the effect of varying amounts of water from various sources to do the calculations. To aid in this understanding, we have provided the following definitions:

- *Batched Water*: The water added by a batcher to a concrete or mortar mixture before or during the initial stages of mixing.
- *Free Water*: The total water in the concrete mixture minus the water absorbed by the aggregate in reaching a saturated, surface-dry condition. Also referred to as "mixing water," this water is considered in the computation of the net water to cement ratio.
- *Free or Surface Moisture*: Free moisture retained on the surface of the aggregate particles and considered to be part of the mixing water in concrete, as distinguished from absorbed moisture. This moisture is water on the aggregate over and above that required to produce a saturated, surface-dry condition.

- *Saturated, Surface-Dry (SSD)*: The condition of an aggregate particle when all permeable voids are filled with water and no water exists on the exposed surfaces of the aggregate (total absorption).
- *Percent Moisture*: The amount of moisture expressed as a percent of the dry weight of the aggregate.
- *Percent Absorption:* The amount of moisture required to produce a saturated, surface-dry condition in the aggregate (all permeable voids filled with water) expressed as a percent of the dry weight.

Example 4-90.1 Sieve Analysis and Combined Grading for Portland Cement Concrete, 37.5 mm Maximum

Given the following gradations and preliminary data:

Sieve Size (a)	37.5 mm x 19 mm (b)	Portion of Combined 40% (c)	25 mm x 4.75 mm (d)	Portion of Combined 20% (e)	Fine (f)	Portion of Combined 40% (g)	Combined Mix (h)	Specification. (i)
50 mm	100	40	100	20	100	40	100	100
37.5 mm	95	38	100	20	100	40	98	90-100
25 mm	8	3	99	20	100	40	63	50-86
19 mm	3	1	95	19	100	40	60	45-75
9.5 mm	0	0	8	2	100	40	42	38-55
4.75 mm	-	-	3	1	95	38	39	30-45
2.36 mm	-	-	0	0	75	30	30	23-38
1.18 mm	-	-	-	-	50	20	20	17-33
600 µm	-	-	-	-	27	11	11	10-22
300 µm	-	-	-	-	12	5	5	4-10
150 µm	-	-	-	-	5	2	2	1-6
75 µm	-	-	-	-	2	1	1	0-3

4-9002H (2a) Preliminary Data and Source

The following known information is used in this section's example calculations.

- 350 kg/m^3 cementitous material, 25 percent of which is fly ash [262 kg – cement, 88 kg – fly ash] *(Standard Specifications)*
- Specific gravity of cement = 3.15 *(known)*
- Specific gravity of fly ash = 2.33 *(known)*
- 40 percent fine aggregate*
- 20 percent 25 mm x 4.75 mm aggregate*
- 40 percent 37.5 mm x 19 mm aggregate
- Nominal penetration – 50 mm*
- 180 kg/m^3 water *
- 1 percent entrapped air*

*From Section 4-9002H, "Design of Mix."

	SSD Specific Gravity	Percent Absorbed Moisture
Fine aggregate (from lab)	2.64	2.1
25 mm x 4.75 mm (from lab)	2.68	1.1
37.5 mm x 19 mm (from lab)	2.65	0.9

4-9002H (2b) Absolute Volumes

Determine the absolute volume of aggregate required per cubic meter of concrete mix. This is to be done by calculating the volume remaining when the absolute volume of cement, fly ash, water, and entrapped air (not entrained air) is subtracted from a cubic meter.

The absolute volume of a material is related to its weight and specific gravity as follows: (For aggregate, specific gravity is based on a saturated, surface-dry condition of the particles.)

Absolute volume in m^3 = $$\frac{weight, kg}{SSD, specific_gravity * 1000} \quad (1)$$

and

Weight in kg. = Absolute volume in m^3 x SSD specific gravity x 1000 (2)

Computation of the absolute volume of aggregate based on the proportions given in "Design of Mix," above, is as follows:

Absolute volume cement =	$\frac{262}{3.15 * 1000} = 0.08 m^3$
Absolute volume fly ash =	$\frac{88}{2.33 * 1000} = 0.04 m^3$
Absolute volume water =	$\frac{180}{1.00 * 1000} = 0.18 m^3$
Absolute volume air =	1 percent = 0.01 m^3
	Total = 0.31 m^3

Subtract the absolute volume of the cement, fly ash, water, and air in the mix from 1 cubic meter; this calculation will give you the K factor.

	1 m^3 – 0.31 m^3	= 0.69 m^3
Aggregate =	0.40 x 0.69 m^3	= 0.28 m^3 (use 0.27 m^3)
25 mm x 4.75 mm =	0.20 x 0.69 m^3	= 0.14 m^3
37.5 mm x 19 mm =	0.40 x 0.69 m^3	= 0.28 m^3

Volume check:

Cement	0.08
Fly ash	0.04
Water	0.18
Air	0.01
37.5 mm	0.27
25 mm	0.14
Sand	0.28
	1.00

4-9002H (2c) Quantities Per Cubic Meter

Compute the weights of the various aggregate sizes on the basis of a saturated, surface-dry condition.

This computation is illustrated by continuing the example as follows:

Weight of cement	= 262 kg/ m^3
Weight of fly ash	= 88 kg/ m^3
Weight of water (total free water)	= 180 kg/ m^3
Weight of SSD fine aggregate:	
0.27 x 2.64 X 1000 (Equation 2)	= 713 kg/ m^3
Weight of SSD 25 mm x 4.75 mm:	
0.14 x 2.68 x 1000 (Equation 2)	= 375 kg/ m^3
Weight of SSD 37.5 mm x 19 mm	
0.28 x 2.65 x 1000	= 742 kg/ m^3
Total	= 2,360 kg/ m^3

4-9002H (2d) Batch Weights Per Cubic Meter

The above design for a cubic meter of concrete is based on aggregate in an SSD condition. As used on the job, aggregate usually contains free moisture in excess of the moisture absorbed. In determining the quantities of aggregate to be placed in the mixer, make allowances for this free moisture.

The free moisture in the aggregate is considered part of the mixing water and, therefore, must be subtracted from the specified amount to be used in the mixture. Increase the weights of aggregate to compensate for the moisture they contain. (Reverse this procedure if the aggregate as used is less than the SSD.)

You can determine the amount of moisture in aggregate by drying representative samples and weighing the samples both before and after drying. If dried to a constant weight (oven-dry condition), you will determine the total moisture. To obtain the free moisture present, make allowances for the absorbed water.

To determine this total moisture in aggregate, you can use many methods. The aggregate can be dried in an oven or in a pan over a hot plate or open fire. If facilities are available, you can use California Test 223, " Surface Moisture in Concrete Aggregates by the Displacement Method (Field Method)," to determine free moisture directly.

Assume, for the example, the *total* moisture in the aggregate is 10.1 percent in the fine aggregate, 3.1 percent in the 25 mm x 4.75 mm aggregate, and 1.9 percent in the 37.5 mm x 19 mm aggregate. Determine the *free* moisture as follows:

Percent free moisture in fine aggregate	= 10.1 %
minus 2.1	= 8.0 %
Percent free moisture in 25 mm x 4.75 mm aggregate	= 3.1 %
minus 1.1	= 2.0 %
Percent free moisture in 37.5 mm x 19 mm aggregate	= 1.9 %
minus 0.9	= 1.0 %

The adjustment in the mix design to compensate for this moisture can now be made as follows:

Kg free moisture in fine aggregate =	$\frac{0.08 * 713}{1.021} = 56 kg/m^3$
Kg free moisture in 25 mm x 4.75 mm aggregate =	$\frac{0.02 * 375}{1.011} = 7 kg/m^3$
Kg free moisture in 37.5 mm x 19 mm aggregate =	$\frac{0.01 * 742}{1.009} = 7 kg/m^3$
Total free moisture from aggregate	= 70 kg/ m^3

Batch weights for a one cubic meter mix as follows:

Cement	= 262 kg/ m^3
Fly ash	= 88 kg/ m^3
Fine aggregate (713+56)	= 769 kg/ m^3
25 mm x 4.75 mm aggregate (375+7)	= 382 kg/ m^3
37.5 mm x 19 mm aggregate (742+7)	= 749 kg/ m^3
Batched water at mixer (180-70)	= 110 kg/ m^3

4-9002H (2e) Scale Weights for Batching Plants

Multiply the values obtained for the one cubic meter mix as determined above in "Batch Weights Per Cubic Meter" by the number of cubic meters in the batch.

4-9002H (3) Reproportioning for Air Entrainment

When entrained air is introduced into a concrete mixture, the increased volume of air must be compensated for by a reduction in the amount of water and sand.

If the percentage of entrapped air is higher than the example of 1 percent, then go back to "Absolute Volumes," under the heading "Computations for Design," and reevaluate the volume proportions.

4-9002H (4) Adjustment of Initial Mix Design

You may adjust the initial mix design after it is used in the field to maintain the specified cement content, improve workability, and stay within the specified penetration and water limits.

You must also make adjustments if California Test 518, "Unit Weight of Fresh Concrete," indicates that the proportions used in the initial design do not produce a cubic meter of plastic concrete. Keep the actual cement content within prescribed limits (as determined by California Test 518) by making adjustments in batch weights as necessary.

4-9003 During the Course of Work

During the work, the resident engineer must do the following:

- Sample the concrete within the requirements and frequencies of Section 90, "Portland Cement Concrete," of the *Standard Specifications* and Chapter 6, "Sampling and Testing," of this manual.
- Make appropriate arrangements for plant inspection.
- Review placement, protection, curing, and staging. Also review concrete washout procedures as they apply to the water pollution control plan.

4-9003A Proportioning and Mixing Operations

This section is primarily a guide for the Caltrans plant inspector, but can be used by anyone who may need to verify that plant operations comply with the contract. During proportioning and mixing operations, do the following:

- Obtain and ensure that the Certificate of Compliance for cement is signed as specified. Sample the cement in accordance with the details in Chapter 6, "Sampling and Testing," of this manual.
- Observe the cement storage facilities to ensure the cement is protected from moisture.
- Obtain samples of the aggregate in accordance with California Test 125, "Sampling Highway Materials and Products Used in the Roadway Structural Sections," and test them for the specified properties in accordance with the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual. For the surface moisture content of fine aggregate, vary the testing frequency depending on the uniformity of supply. A change of 1 percent in the moisture content of sand, if not compensated, may change the penetration of concrete as much as 19 mm and the compressive strength as much as 2 Mpa. You can use California Test 223, "Surface Moisture in Concrete Aggregates by the Displacement Method (Field Method)," or the oven-dry method, in which case you must consider an adjustment for absorption.

  Compare the test results with the data upon which the design was based, and order necessary corrective action. When class or cement content designates the concrete, adjust the design to compensate for any significant differences within the nominal sizes the contractor proposed. When the concrete is designated by compressive strength, order immediate corrective action for any significant deviations in production operations from those used during the production of trial batches.
- Observe the addition of admixtures to ensure they are the agreed-upon products and are dispensed in the specified manner.
- For air-entraining agents, obtain a Certificate of Compliance, when required, for each shipment.

- During proportioning and mixing of materials, ensure the following occur in the quantities and by the methods specified:

  1. At least twice during each shift, ensure scales are balanced at zero load and inspect them for signs of sluggishness, inaccuracy, or damage. Should an apparent problem with the weighing or measurement systems exist, contact the district weights and measures coordinator for the method of correcting the problem. Also, check for sticking materials that do not discharge.

  2. Check that the entry of water into the mixer is timed to ensure that some water is introduced in advance of aggregate and cement. Also, check that all water has been introduced by the end of the first one-fourth of the specified mixing time. Finally, see that no leakage exists that would affect the proper water content.

  3. Check the batch size to ensure it does not exceed the specified capacity or the limit to which the scales were tested during California Test 109, "Test for Weighing and Measuring Devices."

  4. Check the mixer operation to ensure that the automatic timing device is interlocked as specified and that the mixing time is as specified.

  5. Observe the hand-mixing of concrete to ensure it is being mixed in the specified manner.

- For concrete used in pavement, or when required for other types of concrete, ensure that automatic devices perform the proportioning operation as specified. Require the plant operator to demonstrate the function of interlock devices. Limit this check of proportioning interlock tolerances to a visual witnessing of the maximum tolerance settings in the batch computer.

- Perform California Test 518, "Unit Weight of Fresh Concrete," to verify the unit weight, volume, and cement content of concrete in accordance with the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual. Advise the contractor of any changes to be made when the test results do not confirm the correctness of the proportions being used.

  Whenever California Test 518 is performed, the data for batch weights must be the *actual* weights as observed for the batch to be tested. Actual batch weights are available from the delivery ticket. It is not sufficiently accurate to use the ordered batch weights.

  When the unit weight or cement factor varies considerably for no apparent reason, check the accuracy of the scales. For a quick method, weigh a loaded and unloaded truck on platform scales. With this method, you can also detect erratic weighing because of binding scales.

- When air-entraining agents are used, perform California Test 504, "Determining Air Content of Freshly Mixed Concrete by the Pressure Method" to determine the air content of concrete in accordance with the frequencies shown in Section 6-1 of this manual. For air content of more than 4 percent, ensure that the cement is added as specified.

- To determine the consistency of the concrete, perform California Test 533, "Method of Test for Ball Penetration in Fresh Portland Cement Concrete." When specified values are exceeded, order adjustments in the mixture.

Also, use the results of California Test 533, and California Test 529, "Proportions of Coarse Aggregate in Fresh Concrete," to determine the uniformity of concrete. When differences exceed specified values, require the contractor to improve the mixing operation.

- Periodically check the recording of data on tickets for truck mixers or agitators to ensure that the required information is being entered.
- Periodically determine the concrete's temperature to ensure it falls within the specified values.
- Obtain samples of the completed concrete mixture and perform tests in accordance with Section 6-1, "Sample Types and Frequencies," of this manual.

  Analyze the test results continuously and remain alert to any changes in the concrete's uniformity or consistency. When test results so indicate, order corrections in the production operation or provide the contractor with revisions in the mix design, or do both. Reject (based on penetration) excessively wet batches discharged from mixers and not used in the work. Prohibit indiscriminate additions of water to the mixer solely to increase the flow of already workable concrete.

  Record all tests and keep them in the project files. When a specific form is not used for recording test results, such as California Test 533, record the results in the daily report.

4-9003B Mixing and Transporting

During the work, do the following:

- Ensure concrete is transported in accordance with the applicable specifications.
- Ensure the proper mix design is being batched and arrives at the job site. The concrete must arrive with a load ticket that contains the specified information and a Certificate of Compliance for the cement and all mineral admixtures. The weight certificate must also show the actual scale masses (kilograms) for the ingredients batched. Prohibit theoretical or target batch masses as substitutes for actual scale masses. Check the load tickets, and verify that the specified information is actually on the ticket.
- As the concrete is placed, ensure that it is homogeneous and thoroughly mixed and that no lumps or evidence of undispersed cement exists.
- Check truck agitators to determine whether they are being operated at the speed designated by the manufacturer.
- Ensure that bodies on nonagitating hauling equipment do not leak and can self-clean during discharge.
- Ensure that concrete hauled in open-top vehicles is protected (covered) as specified.
- Verify the consistency of the concrete through California Test 533. Record the results on the daily report. If the concrete exceeds the nominal or maximum penetration allowed by the *Standard Specifications*, take appropriate action.
- Additional mix water, when necessary, can be added when the resident engineer or assistant resident engineers authorize. When additional mixing water is authorized, ensure it is mixed as specified. Make corrections in the proportioning if it is necessary to continuously order water at the discharge point.

- Measure the temperature of the concrete periodically. You can obtain the temperature of the fresh concrete from a sample withdrawn from the mixer just before discharge or from within the forms during or immediately after discharge from the mixer.
- When concrete is being hauled in truck mixers or agitators, ensure the discharge is completed within one and one-half hours or 250 revolutions as specified. If the concrete's temperature is 30° C or above, determine the time (less than one and one-half hours) that will be allowed. Advise the contractor accordingly.
- For proper mixing, verify that the concrete delivered in truck mixers or agitators has received the minimum number of revolutions recommended by the manufacturer. However, a minimum of 70 revolutions is a good rule of thumb.
- The temperature requirements for specialty concrete will vary. Refer to the special provisions.
- When nonagitating equipment is used, ensure the discharge is completed within one hour as specified. If the concrete's temperature is 30° C or above, or under other conditions contributing to quick stiffening of the concrete, ensure the discharge is completed within 45 minutes as specified.
- In the daily report, note the concrete's temperature and decisions relating to that measurement.
- For transit-mixed concrete, you cannot determine directly from the revolution counter the requirements for minimum and maximum revolutions of mixing at the mixing speed. However, in many instances, a simple calculation based on the total number of mixing revolutions and the hauling time will verify compliance with the specifications. If, because of the circumstances of long hauls or other reasons, such a calculation is not possible, you can ask the supplier for the schedule of time the drum will be operated at mixing speed. At the end of that time, the operator can reduce drum speed to agitating range. The number of revolutions at mixing speed is not considered to be as important as the total number of revolutions of mixing. However, at very low rpm's of the mixer and at the minimum number of revolutions, it is possible that inadequate mixing will result.
- Sample concrete and fabricate test cylinders in accordance with Section 6-1, "Sample Types and Frequencies," in this manual.
- Do not allow trucks to exceed the weight limits, especially for bridges, given in Section 7-1.02, "Load Limitations," of the *Standard Specifications*.

4-9003C Curing Concrete

Ensure the contractor applies the proper cure method in accordance with the specifications. Periodically check that the contractor is maintaining the cure through the curing period.

4-9003D Protecting Concrete

Anticipate adverse weather conditions, and discuss options with the contractor. Require the contractor to submit a written plan on methods to protect the concrete if adverse weather sets in.

Concrete needs time to attain sufficient strength to carry loads. Do not allow anyone to drive or place equipment or loads on the pavement when those loads are greater than those allowed by the contract.

4-9004 Measurement and Payment

4-9004 Measurement and Payment

Measurement and payment must comply with the applicable sections of this manual and the special provisions, *Standard Specifications*, and *Bridge Construction Records and Procedures Manual*.

Review and document the results of acceptance testing in accordance with Chapter 6, “Sampling and Testing,” of this manual. Take appropriate remedial action or deductions for failing results on acceptance tests.

Section 91 Paint

Section 91
Paint

4-9101 General

4-9101
General

Section 91, "Paint," of the *Standard Specifications*, covers material requirements for paint. Painting requirements and types of paint to be used in specific applications are included in other *Standard Specification* sections that require surfaces to be painted.

4-9102 Before Work Begins

4-9102
Before Work Begins

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers paint.

4-9103 During the Course of Work

4-9103
During the Course of Work

- Ensure the Office of Materials Engineering and Testing Services has inspected the paint.
- Ensure that the paint is packaged and labeled as required in the specifications.
- Inspect the paint in accordance with Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," in the *Construction Manual* (manual).
- Take samples of the paint in accordance with the tables in Section 6-1, "Sample Types and Frequencies," and with Section 6-2 in this manual.

4-9104 Measurement and Payment

4-9104
Measurement and Payment

Measurement and payment clauses are included in the various *Standard Specification* sections or special provisions that discuss the application of paint.

Section 92 Asphalts

Section 92
Asphalts

4-9201 General

4-9201
General

Asphalt, as defined in Section 92, "Asphalts," of the *Standard Specifications*, is also referred to as paving asphalt. Asphalt is used in asphalt concrete, in asphalt-treated permeable base, and when specified, for tack coat (paint binder). It is a solid at normal ambient temperatures and must be heated before it is mixed with aggregates or applied as tack coat (paint binder).

In addition to the specifications for asphalts in Section 92 of the *Standard Specifications*, refer to the requirements for asphalts in other sections of the *Standard Specifications* covering work in which asphalts are used.

4-9202 Before Work Begins

4-9202
Before Work Begins

Before work begins, take the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers asphalt.
- When asphalt is used for tack coat (paint binder), examine the distributor truck and ensure it meets the specified requirements.
- When required, ensure the contractor properly equips delivery trucks, storage tanks, and spreading equipment with the specified devices for measuring asphalt volumes.

4-9203 During the Course of Work

4-9203
During the Course
of Work

During the work, take the following steps:

- If asphalt is used before sampling and testing, obtain a Certificate of Compliance containing the specified information.
- Check the temperature of the asphalt to ensure it is within the specified range when applied as tack coat (paint binder) at job site or mixed with aggregate for asphalt concrete or asphalt-treated permeable base at plant.
- Before paving asphalt is applied as tack coat (paint binder), ensure the pavement is clean and dry.
- Check the application rate of asphalt used as tack coat (paint binder) to ensure the designated rate. After the first few hundred meters of application, check the initial spread rate. The frequency for checking the spread rate will depend on the accuracy and consistency of the first few checks. Record the spot-check results and the overall daily spread rate in the daily report.
- Ensure that asphalt is not sprayed outside designated areas and that bituminous material does not drip from distribution equipment.

- Sample asphalt in accordance with the table in Section 6-1, “Sample Types and Frequencies,” of the *Construction Manual* (manual) and with the manual’s instructions in Section 6-202E, “Materials Accepted on the Basis of a Certificate of Compliance.”

4-9204 Measurement and Payment

4-9204 Measurement and Payment

Section 92, ”Asphalts,” of the *Standard Specifications,* does not contain provisions for payment. Payment clauses for asphalts are found in the various sections covering work in which asphalts are used.

It is a good practice, before the asphalt is discharged, to measure the volume in the distributor truck and to make this volumetric measurement again whenever a partial load leaves the work. These actions result in a good check against scale weights, and the second measurement may be used if the contractor fails to submit a weight ticket for the unused asphalt.

When making volumetric measurements, measure the temperature, and apply the proper factors for converting volume to mass.

Section 93 Liquid Asphalts

Section 93
Liquid Asphalts

4-9301 General

4-9301
General

Liquid asphalt is used for penetration treatment and prime coat, both of which are covered in Section 608.3, "Asphalt Surface Treatments," of the *Highway Design Manual*. Liquid asphalts are also used in the manufacture of asphalt concrete "cold mix" used in highway maintenance for temporary repairs.

In addition to the specifications for liquid asphalts in Section 93, "Liquid Asphalts," of the *Standard Specifications*, refer to the requirements for liquid asphalts in other sections of the *Standard Specifications* covering work in which liquid asphalts are used.

4-9302 Before Work Begins

4-9302
Before Work Begins

Before work begins, take the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers liquid asphalt.
- Examine the distributor truck to ensure it meets the specified requirements.
- When required, ensure the contractor properly equips delivery trucks, storage tanks, and spreading equipment with the specified devices for measuring the volume of liquid asphalt.

4-9303 During the Course of Work

4-9303
During the Course
of Work

During the work, take the following steps:

- If liquid asphalt is used before sampling and testing, obtain a Certificate of Compliance containing the specified information.
- Check the temperature of the liquid asphalt to ensure it is within the specified range when applied.
- Before applying liquid asphalt, ensure the surface to be treated is clean and dry.
- Ensure that liquid asphalt is not sprayed outside designated areas and that bituminous material does not drip from distribution equipment.
- Check the application rate of liquid asphalt to ensure the designated rate. After the first few hundred meters of application, check the initial spread rate. The frequency for checking the spread rate will depend on the accuracy and consistency of the first few checks. Record the spot-check results and the overall daily spread rate in the daily report.

- Sample liquid asphalt in accordance with the table in Section 6-1, “Sample Types and Frequencies,” of the *Construction Manual* (manual) and with the manual’s instructions in Section 6-202E, “Materials Accepted on the Basis of a Certificate of Compliance.”

4-9304 Measurement and Payment

4-9304 Measurement and Payment

Section 93, ”Liquid Asphalts,” of the *Standard Specifications*, does not contain provisions for payment. Payment clauses for liquid asphalts are in the various sections covering work in which liquid asphalts are used.

It is a good practice, before the asphalt is discharged, to measure the volume in the distributor truck and to make this volumetric measurement again whenever a partial load leaves the work. These actions result in a good check against scale weights, and the second measurement may be used if the contractor fails to submit a weight ticket for the unused asphalt.

When making volumetric measurements, measure the temperature and apply the proper factors for converting volume to mass.

Section 94 Asphaltic Emulsions

Section 94 Asphaltic Emulsions

4-9401 General

4-9401 General

Asphaltic emulsions are described in Section 94, "Asphaltic Emulsions," of the *Standard Specifications*. They are used for bituminous seals and tack coat (paint binder). Asphaltic emulsions are also used for other purposes, such as curing seals for lime stabilization and cement-treated base and for coating the surface of cement-treated permeable base to facilitate measuring the thickness of concrete pavement.

In addition to the specifications for asphaltic emulsions in Section 94, of the *Standard Specifications*, refer to the requirements for asphaltic emulsions in other sections of the *Standard Specifications* covering work in which asphaltic emulsions are used.

4-9402 Before Work Begins

4-9402 Before Work Begins

Before work begins, take the following steps:

- Verify the receipt and proper distribution of Form CEM-3101, "Notice of Materials to Be Used," which covers asphaltic emulsion.
- Examine the distributor truck to ensure it meets the specified requirements.
- Ensure the contractor properly equips delivery trucks, storage tanks, and spreading equipment with specified devices for measuring volumes of asphaltic emulsion.

4-9403 During the Course of Work

4-9403 During the Course of Work

During the work, take the following steps:

- If asphaltic emulsion is used before sampling and testing, obtain a Certificate of Compliance containing the specified information.
- Check the temperature of the asphaltic emulsion to ensure it is within the specified range when applied.
- Before applying asphaltic emulsion, ensure the surface to be treated is clean and dry.
- Ensure that asphaltic emulsion is not sprayed outside designated areas and that bituminous material does not drip from distribution equipment.
- Check the application rate of asphaltic emulsion to ensure the designated rate. After the first few hundred meters of application, check the initial spread rate. The frequency for checking the spread rate will depend on the accuracy and consistency of the first few checks. Record the spot-check results and the overall daily spread rate in the daily report.

- Sample asphaltic emulsion in accordance with the table in Section 6-1, "Sample Types and Frequencies," of the *Construction Manual* (manual) and the manual's instructions in Section 6-202E, "Materials Accepted on the Basis of a Certificate of Compliance." If water has been added to the asphaltic emulsion, note on Form TL-0101, "Sample Identification Card," the ratio of added water to the total mixture.

4-9404 Measurement and Payment

4-9404 Measurement and Payment

Section 94, "Asphaltic Emulsions," of the *Standard Specifications,* does not contain provisions for payment. Payment clauses for asphaltic emulsions are in the various sections covering work in which asphaltic emulsions are used.

Obtain weight tickets for deliveries of asphaltic emulsion.

It is a good practice, before the asphaltic emulsion is discharged, to measure the volume in the distributor and to make this volumetric measurement again whenever a partial load leaves the work. These actions result in a good check against scale weights, and the second measurement may be used if the contractor fails to submit a weight ticket for the unused asphaltic emulsion.

When the specifications provide for additional water to be mixed with asphaltic emulsion, it is necessary to determine the mass of asphaltic emulsion without the mass of the added water. Delivery weight tickets will show the mass of the emulsion before water was added and the total mass of asphaltic emulsion and added water.

When making volumetric measurements, measure the temperature, and apply the proper factors for converting volume to mass.

In a partial load using volumetric measurements, the procedure for determining the mass of asphaltic emulsion with added water is as follows:

1. Measure the volume and temperature of the mixture in the partial load. Calculate the volume of emulsion in the original load at the temperature of the partial load. Convert tonnes of added water in the original load to liters.
2. Based on the final temperature reading, calculate the ratio of the volume of asphaltic emulsion to the total volume in the original load.
3. Calculate the volume, at 15°C, of emulsion in the partial load.
4. Determine the mass of emulsion remaining in the partial load.

<u>Example:</u>
Assume the following:

- Weight ticket shows 10.00 t of emulsion and 5.00 t of added water. (Total = 15 t.) Temperature at time of weighing was 75°C.
- 2020 L of emulsion and added water remain in the partial load. At the time of measuring, the temperature of the mixture is 55°C.

Using these assumptions, calculate as follows:

1. Volume of emulsion (at 55°C) in the original load:

   10.00 t X 1002 L/t @ 15°C ÷ 0.98225 (see the conversion table, Section 94-1.07, "Measurement," of the *Standard Specifications*) = 10201 L

2. Volume of added water in the original load:

   5 X 1000 = 5000 L

3. Ratio of volume of emulsion @ 55°C to total volume in the original load:

   10201/15201 = 0.671

4. Volume @ 15°C of emulsion in the partial load:

   0.671 X 2020 X 0.98225 = 1331 L

5. Mass of emulsion in partial load:

   1331 ÷ 1002 = 1.33 t

6. Emulsion used on the project:

   10.00 – 1.33 = 8.67 t

Section 95 Epoxy

Section 95
Epoxy

4-9501 General

4-9501
General

Epoxy is a two-component adhesive used for a number of applications, including the following:

- Bonding pavement markers to pavement
- Pressure grouting cracks in concrete
- Bonding new portland cement concrete to old portland cement concrete
- Manufacturing epoxy concrete and epoxy mortar

The *Bridge Construction Records and Procedures Manual* contains additional information on epoxy.

4-9502 Before Work Begins

4-9502
Before Work Begins

Verify the receipt and proper distribution of Form CEM-3101, “Notice of Materials to Be Used,” which covers epoxy.

4-9503 During the Course of Work

4-9503
During the Course of Work

During the work, take the following steps:

- Ensure the Office of Materials Engineering and Testing Services has inspected the epoxy.
- Ensure the epoxy is packaged and labeled as required in the specifications for its intended use.
- Inspect the epoxy in accordance with Section 6-203, “Materials Manufactured to Caltrans-specified Formulation,” of the *Construction Manual.*

4-9504 Measurement and Payment

4-9504
Measurement and Payment

Payment clauses are included in the various *Standard Specification* sections or special provisions that provide for the use of epoxy. When specified, payment for epoxy is normally included in the contract price for other items of work in which epoxy is used. There are no separate measurement clauses for epoxy.

Conduct of the Work

5-001 Resident Engineer’s Pending File

5-002 Preconstruction Conference With State Personnel

5-003 Preconstruction Conferences with the Contractor

5-004 Resident Engineer's Daily Report

5-005 Assistant Resident Engineer's Daily Report

5-006 Maintenance Reviews

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 clearance, including any documents, permits, and agreements.
- 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

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
- 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

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, the resident engineer must invite the maintenance superintendent, supervisor, or both for a final field review of the project. Ensure this review includes identifying all items necessary to maintain post-acceptance storm water mitigation measures (as outlined in the Caltrans Storm Water Management Program) and all actions construction will complete to ensure these items are in good condition. To find the program, go to the following Caltrans’ Intranet address:

http://trenv.dot.ca.gov/stormwater/index.htm

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.

Section 1 Project Records and Reports

5-101 Forms Used For Contract Administration

5-101A General

5-101B Construction Forms

Form CEM-0101, Resident Engineer's Report of Assignment
Form CEM-0501, Relief from Maintenance
Form CEM-0601, Construction Safety Report
Form CEM-0602, Project Safety Program Statement
Form CEM-0603, Major Construction Incident Notification
Form CEM-1201, Subcontracting Request
Form CEM-2001, National Pollution Discharge Elimination System Annual Certification
Form CEM-2002, Notification of Construction (NOC)
Form CEM-2003, Notification of Completion of Construction (NCC)
Form CEM-2101, COZEEP Daily Report
Form CEM-2102, COZEEP/MAZEEP Task Order
Form CEM-2401, Substitution Report for Disadvantaged Business Enterprise/Disabled Veteran Business Enterprise
Form CEM-2402(F), Final Report- Utilization of Disadvantaged Business Enterprises (DBE), First - Tier Subcontractors (Federally Funded Projects)
Form CEM-2402(S), Final Report - Utilization of Disabled Veteran Business Enterprises (DVBE) State Funded Projects
Form CEM-2403(F), Disadvantaged Business Enterprises (DBE) Certification Status Change
Form CEM-2404(F), Monthly DBE Trucking Verification
Form CEM-2501, Fringe Benefit Statement
Form CEM-2502, Contractor/Subcontractor Payroll
Form CEM-2503, Statement of Compliance
Form CEM-2504, Employee Interview: Labor Compliance/EEO
Form CEM-2505, Owner - Operator Listing Statement of Compliance
Form CEM-2506, Labor Compliance – Wage Violation
Form CEM-2507, Labor Violation: Case Summary
Form CEM-2508, Contractor's Payroll Source Document Review
Form CEM-2509, Checklist – Source Document Review
Form CEM-2601, Construction Progress Chart

Form CEM-2701, Weekly Statement of Working Days
Form CEM-2702, Overrun in Contract Time
Form CEM-3101, Notice of Materials to be Used
Form CEM-3501, AC Production/Placement Checklist
Form CEM-3701, Test Result Summary
Form CEM-3702, Relative Compaction Summary
Form CEM-4101, Materials Release Summary
Form CEM-4102, Material Inspected and Released on Job
Form CEM-4202, Material Plant Safety Checklist
Form CEM-4204, California Test 109 Sticker
Form CEM-4501, Resident Engineer's Daily Report/Assistant Resident Engineer's Daily Report
Form CEM-4601, Assistant Resident Engineer's Daily Report
Form CEM-4701, Drainage System Summary
Form CEM-4801, Quantity Calculations
Form CEM-4900, Contract Change Order
Form CEM-4901, Contract Change Order Input
Form CEM-4902, Extra Work Bill (Short Form)
Form CEM 4902A, Extra Work Bill - Title Page
Form CEM-4902B, Extra Work Bill - Labor Charges
Form CEM-4902C, Extra Work Bill - Equipment Charges
Form CEM-4902D, Extra Work Bill - Material Charges
Form CEM-4903, Contract Change Order Memorandum
Form CEM-5101, Request for Payment for Materials on Hand
Form CEM-6001, Project Record - Estimate Request
Form CEM-6002, Contract Administration System (CAS) –Report Requests
Form CEM-6003, Progress Pay - Estimate Project Initiation or Update
Form CEM-6004, Contract Transactions Input
Form CEM-6201, Notice of Potential Claim
Form CEM-6301, Contract Acceptance
Form CEM-9001 Construction Manual Proposed Change

5-101C Division of Materials Engineering and Testing Services Forms

Form TL-0028, Notice of Materials to be Inspected
Form TL-0029, Report of Inspection of Material
Form TL-0101, Sample Identification Card
Form TL-0502, Field Sample of Portland Cement Concrete Sample Card
Form MR-0518, Job Cement Samples Record
Form TL-0608, Notice of Materials to be Furnished
Form TL-0624, Inspection Release Tag
Form TL-0649, Inspector's Report of Material on Hand
Form TL-3096, Pavement Core Record
Form TL-6037, Fabrication Progress Report

5-101D Other State Forms
Form DAS-1, Apprentice Agreement
Form H-ESP-16, Request for Construction Staking
Form LA-16, Product, Material, or Method Report (For Highway Planting or Erosion Control)
Form LA-17, Report of Chemical Spray Operations
Form TR-0019, Notice of Change in Clearance or Bridge Weight Rating
Form TR-0020, Notice of Change in Vertical or Horizontal Clearance
Form TR-0029, Notice of Change in Clearance or Bridge Weight Rating
5-101E Federal Forms
Form FHWA-47M Statement of Materials and Labor Used By Contractors On Highway Construction Involving Federal Funds
Form FHWA-1022 United States Department of Transportation Notice
Form FHWA-1391 Federal-Aid Highway Construction Contractors Annual EEO Report
Form DOL SF-308 Request for Wage Determination and Response to Request Equal Employment Opportunity Is The Law Poster
Form FHWA-1495 Wage Rate Information Federal-Aid Highway Project

5-102 Organization of Project Documents
5-102A General
5-102B Indexing
5-102C Description of Categories
5-102D Category Numbers And Headings
5-102E Alphabetical Listing Of Categories

5-103 The Contract Administration System, CAS
5-103A General
Table 3-2.1 The Contract Administration System
5-103B Project Initiation and Update
5-103B (1) Completing Form CEM-6003, "Project Pay-Estimate Project Initiation or Update"
5-103B (1a) Project Key
5-103B (1b) Card type C05 (each field is independent and can be updated separately)
5-103B (1c) Card type C06 to C08
5-103B (1d) Card type C09 to C14
5-103B (1e) Card type C15
5-103B (2) Processing

5-103C Contract Transactions
5-103C (1) Transaction Types
5-103C (1a) Contract Item Transactions
5-103C (1b) Miscellaneous Transactions
5-103C (1c) Contract Change Order Transactions
5-103C (2) Completing Form CEM-6005, "Contract Transaction Input"
5-103C (2a) Contract Item Entries
5-103C (2b) Miscellaneous Transactions
5-103C (2c) Contract Change Order Transactions
5-103C (2d) General
5-103C (2e) Audit Trail
5-103C (3) Computer Processing
5-103D Contract Change Orders
5-103D (1) Completing Form CEM-4901, "Contract Change Order Input"
5-103D (1a) File
5-103D (1b) Update
5-103D (1c) Replace
5-103D (1d) Delete
5-103D (2) Edits
5-103E Extra Work Billing
5-103E (1) Preparing Form CEM-4902, Daily Extra Work Report
5-103E (1a) Basic Information (Title Page)
5-103E (1b) Equipment
5-103E (1c) Other Expenses Subject to Labor Markup
5-103E (1d) Material or Work Done by Specialists, Lump Sum, or Unit Price Payments
5-103E (1e) Signature of Prime Contractor's Representative
5-103E (2) Processing Form CEM-4902
5-103E (3) Corrections to Extra Work Bills
5-103F Generating Estimates
5-103F (1) Procedure
5-103F (1a) Preparing Form CEM-6001, "Project Record Estimate Request"
5-103F (1b) Estimate Parameters:
5-103F (1c) Deductions:
5-103F (2) Computer Processing
5-103F (2a) Estimate Edits
5-103F (2b) Estimate Output
5-103F (3) Potential Problems
5-103G Approval of Estimates
5-103G (1) The Resident Engineer
5-103G (2) The District Director
5-103G (3) Flagging an Estimate for Payment

5-103H Reports Available Through CAS
5-103H (1) District (XX) Estimate Status
5-103H (2) Project Management
5-103H (2a) The Project File Status Report
5-103H (2b) The Exceptional Contracts Report
5-103H (3) District (XX) Project Status
5-103H (4) Progress Payment-Work Done by Office of Structures (Copies)
5-103H (5) Project Record-Estimate (Copies)
5-103H (6) Status of Contract Items
5-103H (7) Project Record Item Sheet
5-103H (8) Status of Contract Change Orders
5-103H (9) CCO Master Listing
5-103H (10) Bridge Quantities by Structure
5-103H (11) District (XX) Status of Anticipated Changes
5-103H (12) Project Record-Estimate (Dummy)
5-103H (13) Contract Contents Report
5-103H (14) Contract Contents Report-Contract Item Records
5-103H (15) Contract Contents Report-Contract Progress
5-103H (16) DEWRs in Holding File
5-103H (17) Daily Extra Work Report
5-103H (18) Rental Rates and Codes for Miscellaneous Equipment
5-103H (19) Reports for the Office of Structure Construction
5-103I Field Audits by Accounting Office

5-104 Final Construction Project Records
5-104A General
5-104B Public Access to Project Records
5-104C Disposition of Construction Project Records
5-104D As-Built Plans

Section 1 Project Records and Reports

Section 1
Project Records
and Reports

5-101 Forms Used For Contract Administration

5-101
Forms Used
For Contract
Administration

5-101A General

One of the duties of the resident engineer is to keep accurate and complete records of the work. This section includes a list of forms used in administering a construction project and maintaining records. Use forms not related directly to contract administration, such as personnel documents and accounting forms, in accordance with instructions contained in other Caltrans manuals.

The Division of Construction issues new or revised construction forms. All Division of Construction forms have a prefix of CEM and a number that is related to the form's uniform filing system category. If an existing form no longer meets the need that it was designed for, use the following procedure to implement a change:

- Complete Form CEM-9001, "Construction Manual Proposed Change", and send it to the Division of Construction forms coordinator. Explain the reason for the proposed change and attach a draft of the proposed revised form.
- The Division of Construction will review the proposed change and make a decision regarding any future revision.

Not all forms issued by the Office of Materials Engineering and Testing Services (METS) are listed in this manual. If a test method includes a specific form, contact METS.

A list of forms issued by the Division of Structure Construction is shown in Volume I, Section 16 of the *Bridge Construction Records and Procedures Manual*.

5-101B Construction Forms

Order construction forms by stock number from district warehouses or stockrooms. Forms without stock numbers may be found on the Caltrans Electronic Form System's (CEFS) Intranet web site: http://adsc.caltrans.ca.gov/CEFS/. The appendix to the *Construction Manual* (manual) contains samples of the construction forms.

Following is a list and descriptions of the Division of Construction forms:

Form CEM-0101, Resident Engineer's Report of Assignment

When assigned to a new project, the resident engineer must use Form CEM-0101, "Resident Engineer's Report of Assignment." This provides contact information. Distribute copies of the report according to instructions on the form and any district instructions.

It is not necessary or desirable to hold the form until all information is available. Submit partial information with a note that a supplemental form will follow.

Form CEM-0501, Relief from Maintenance

The resident engineer uses Form CEM-0501, "Relief from Maintenance," to recommend that the contractor be relieved from maintenance and responsibility in

accordance with Section 7-1.15, “Relief from Maintenance and Responsibility,” of the *Standard Specifications.* For more information see Section 3-709, “Relief from Maintenance and Responsibility,” of this manual.

Form CEM-0601, Construction Safety Report

The resident engineer or the project safety coordinator uses Form CEM-0601, “Construction Safety Report,” to document monthly project safety reviews.

Form CEM-0602, Project Safety Program Statement

The resident engineer uses Form CEM-0602, “Project Safety Program Statement,” to list the Code of Safe Practices which apply to the project. This form may also be used to designate an employee as the project safety coordinator.

Form CEM-0603, Major Construction Incident Notification

The resident engineer uses Form CEM-0603, “Major Construction Incident Notification,” to report major construction incidents. Instructions for use are included on the back of the form.

Form CEM-1201, Subcontracting Request (Stock # 7541-3514-7)

The contractor submits Form CEM-1201, “Subcontracting Request.” The resident engineer uses the form to calculate the percentage of work to be performed by the contractor. Section 2-08, “Prosecution and Progress,” of this manual describes the procedures. The resident engineer must approve this form before the contractor can begin on the applicable subcontracted work.

Form CEM-2001, National Pollution Discharge Elimination System Annual Certification

The resident engineer uses Form CEM-2001, “National Pollution Discharge Elimination System Annual Certification,” to file the annual storm water permit certification by July 1 of each year. See Chapter 7, “Environmental,” for details on the storm water permit certification.

Form CEM-2002, Notification of Construction (NOC)

The resident engineer, with the assistance of the district construction storm water coordinator, fills out Form CEM-2002, “Notification of Construction (NOC)”. The Caltrans National Pollutant Discharge Elimination System Permit requires Caltrans to submit the notification to the Regional Water Control Board. Instructions are included on the back of the form.

Form CEM-2003, Notification of Completion of Construction (NCC)

Submits Form CEM-2003,” Notification of Completion of Construction (NCC),” for projects requiring a storm water pollution prevention plan to the Regional Water Quality Control Board upon completion of construction. Usually, the resident engineer submits the notification. However, districts may elect to have the storm water coordinator, project manager, construction engineer, or other responsible staff submit this form. This form is not required for water pollution control plan projects. Directions are on the back of the form.

Form CEM-2101, COZEEP Daily Report

Jointly, The California Highway Patrol and Caltrans use Form CEM-2101, "COZEEP Daily Report," to report highway patrol resources used for the Construction Zone Enhanced Enforcement Program. Chapter 2, "Safety and Traffic," of this manual describes the use of Form CEM-2101.

Form CEM-2102, COZEEP/MAZEEP Task Order

The resident engineer uses Form CEM-2102, "COZEEP/MAZEEP Task Order," to request highway patrol support for the Construction Zone Enhanced Enforcement Program. The use of this form is described in Section 2, "Safety and Traffic," of this manual.

Form CEM-2401, Substitution Report for Disadvantaged Business Enterprise/ Disabled Veteran Business Enterprise (*Stock # 7541-3507-3*)

The contractor fills out Form CEM-2401, "Substitution Report for Disadvantaged Business Enterprise/Disabled Veteran Business Enterprise." The resident engineer uses the form to approve disadvantaged business enterprise (DBE) subcontractor substitutions. For more information on substituting subcontractors refer to Sections 3-8, "Prosecution and Progress," and 8-3, "Disadvantaged Business," of this manual.

Form CEM-2402(F), Final Report- Utilization of Disadvantaged Business Enterprises (DBE), First - Tier Subcontractors (Federally Funded Projects) (*Stock # 7541-3502-2*)

The contractor fills out and certifies Form CEM-2402(F), "Final Report- Utilization of Disadvantaged Business Enterprises (DBE), First - Tier Subcontractors (Federally Funded Projects)." The resident engineer verifies the form. It describes work performed and materials provided by disadvantaged business enterprise subcontractors. See Section 8-3, "Disadvantaged Business," of this manual for details.

Form CEM-2402(S), Final Report - Utilization of Disabled Veteran Business Enterprises (DVBE) State Funded Projects

The contractor fills out and certifies Form CEM-2402(S), "Final Report - Utilization of Disabled Veteran Business Enterprises (DVBE) State Funded Projects." The resident engineer verifies the form. It describes work performed and materials provided by disabled veteran business enterprise subcontractors on state funded projects. See Section 8-3, "Disadvantaged Business," of this manual for details.

Form CEM-2403(F), Disadvantaged Business Enterprises (DBE) Certification Status Change

The contractor fills out and certifies Form CEM-2403(F), "Disadvantaged Business Enterprises (DBE) Certification Status Change." The resident engineer uses this form to verify the actual dollar amount paid to DBE subcontractors on federally funded projects that have a change in certification status during the course of the contract. See Section 8-3, "Disadvantaged Business," of this manual for details.

Form CEM-2404(F), Monthly DBE Trucking Verification

The contractor must submit Form CEM-2404(F), "Monthly DBE Trucking Verification," before the 15th of each month. It lists the dollar amount paid to the DBE trucking companies for truck work performed by DBE certified truckers and for any fees or commissions for non-DBE truckers utilized each month on the project. Instructions for filling out this form are on the back of the form.

Form CEM-2501, Fringe Benefit Statement

The contractor completes Form CEM-2501, "Fringe Benefit Statement," for labor compliance purposes. See Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2502, Contractor/Subcontractor Payroll

When it is requested, furnish "Form CEM-2502, Contractor/Subcontractor Payroll," to the contractor. It is used to fulfill the payroll submittal requirements of the contract. See Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2503, Statement of Compliance

The contractor may use Form CEM-2503, "Statement of Compliance," for the required statement of compliance with payroll submittals. See Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2404, Employee Interview: Labor Compliance/EEO
(Stock # 7541-3512-3)

Use Form CEM-2504, "Employee Interview: Labor Compliance/EEO," to record information from interviews of contractors' employees. Directions to interviewer are on the back of the form. See Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2505, Owner - Operator Listing Statement of Compliance

If they do not include this data on their certified payrolls, contractors may use Form CEM-2505, "Owner - Operator Listing Statement of Compliance," for reporting payments made to owner-operators. See Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2506, Labor Compliance – Wage Violation

The district labor compliance officer uses Form CEM-2506, "Labor Compliance – Wage Violation," to document labor compliance wage violations. See Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2507, Labor Violation: Case Summary

The district labor compliance officer uses Form CEM-2507, "Labor Violation: Case Summary," in conjunction with Form CEM-2506 to summarize labor violation cases. See Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2508, Contractor's Payroll Source Document Review

The district labor compliance officer uses Form CEM-2508, "Contractor's Payroll Source Document Review" to document the verification of the contractors' payroll source document review. See Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2509, Checklist – Source Document Review

The district labor compliance officer uses Form CEM-2509, "Checklist – Source Document Review," during the contractor's payroll source document review. See Section 8-1, "Labor Compliance," of this manual for more information.

Form CEM-2601, Construction Progress Chart

The resident engineer maintains Form CEM-2601, "Construction Progress Chart," for each project. See Section 3-8, "Prosecution and Progress," of this manual for details.

Form CEM-2701, Weekly Statement of Working Days (Stock # 7541-3528-7)

The resident engineer uses Form CEM-2701, "Weekly Statement of Working Days," to track contract time on construction contracts. The back of the form and Section 3-8, "Prosecution and Progress," of this manual contain instructions for filling out the weekly statement of working days.

Form CEM-2702, Overrun in Contract Time

The Division of Construction uses Form CEM-2702, "Overrun in Contract Time," to approve "director days." For more information see Section 3-8, "Prosecution and Progress," of this manual.

Form CEM-3101, Notice of Materials to Be Used (Stock # 7541-3511-1)

The contractor must use Form CEM-3101, "Notice of Materials to Be Used," to list all materials to be used on the project. See Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of this manual for details on the use of this form. Instructions to the contractor are on the back of the form.

Form CEM-3501, AC Production/Placement Checklist

Resident engineers and assistant resident engineers may use Form CEM-3501, "AC Production/Placement Checklist," to identify asphalt concrete paving problems.

Form CEM-3701, Test Result Summary

Resident engineers may use Form CEM-3701, "Test Result Summary" to summarize acceptance tests on each material. See Category 37, "Initial Tests and Acceptance Tests," in Section 5-102, "Organization of Project Documents," of this manual for details.

Form CEM-3702, Relative Compaction Summary

Resident engineers may use Form CEM-3702, "Relative Compaction Summary," to summarize compaction test results in the same manner that Form CEM-3701 is used for other tests.

Form CEM-4101, Materials Release Summary

Resident engineers use Form CEM-4101, "Materials Release Summary," to summarize the materials released by METS and materials inspected at the job site.

Form CEM-4102, Material Inspected and Released on Job

Resident engineers use Form CEM-4102, "Material Inspected and Released on Job," to list certain materials that may arrive on the job site without a Form TL-0029, "Report of Inspection of Material." See Section 6-3, "Field Tests," of this manual for details.

Form CEM-4202, Material Plant Safety Checklist

The materials plant inspector uses Form CEM-4202, "Material Plant Safety Checklist," when checking a materials plant for safety.

Form CEM-4204, California Test 109 Sticker

The district weights and measures coordinator affixes Form CEM-4204, "California Test 109 Sticker" to each scale tested in accordance with California Test 109. Obtain the form from the Division of Construction weights and measures coordinator. Sample form not in appendix. See Section 3-903E, "Weighing and Metering Procedures," of this manual for details.

Form CEM-4501, Resident Engineer's Daily Report/Assistant Resident Engineer's Daily Report (Stock # 7541-3506-1)

The resident engineer and the assistant resident engineers use Form CEM-4501, "Resident Engineer's Daily Report/Assistant Resident Engineer's Daily Report," to record project activities daily. For more information see Section 5-0, "Conduct of the Work," of this manual.

Form CEM-4601, Assistant Resident Engineer's Daily Report (Stock # 7541-3504-6)

Assistant resident engineers use Form CEM-4601, "Assistant Resident Engineer's Daily Report," to record daily individual contract item activity. It is also used to record extra work activity and to verify contractors' personnel listed on payrolls. For more information see Section 5-0, "Conduct of the Work," of this manual.

Form CEM-4701, Drainage System Summary (Stock # 7541-3521-2)

Resident engineers and assistant resident engineers use Form CEM-4701, "Drainage System Summary," to record progress and summarize activity on drainage contract items. See category 47, "Drainage Systems," in Section 5-102, "Organization of Project Documents," of this manual for details.

Form CEM-4801, Quantity Calculations (Stock # 7541-3520-0)

Resident engineers and assistant resident engineers use Form CEM-4801, "Quantity Calculations," for the basic source document for most contract item quantity calculations.

Form CEM-4900, Contract Change Order (Stock # 7541-3501-0)

Resident engineers use Form CEM-4900, "Contract Change Order," for contract change orders. See Section 5-3, "Contract Change Orders," of this manual for information about contract change orders.

Form CEM-4901, Contract Change Order Input (Stock # 7541-3516-2)

Resident engineers and assistant resident engineers use Form CEM-4901, "Contract Change Order Input," to input contract change orders for the project record and estimate data. See Section 5-103D, "Contract Change Orders," of this manual for details.

Form CEM-4902, Extra Work Bill (Short Form) (Stock # 7541-3500-8)

Contractors use Form CEM-4902, "Extra Work Bill (Short Form)," for billing extra work. Details for use are on the back of the form and are also included in Section 5-103E, "Extra Work Billing," of this manual. The resident engineer may approve contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit extra work bill data on a computer report identical to Form CEM-4902 for all Caltrans projects.

Form CEM 4902A, Extra Work Bill - Title Page (Stock # 7541-3496-7)

Contractors use Form CEM 4902A, "Extra Work Bill - Title Page," for billing extra work. It is the first page of the 4-part extra work bill. It identifies the project, contract change order number, method of payment and performer of work. This form also provides for manual calculation of the bill. Details for use are on the back of the form and are also included in Section 5-103E, "Extra Work Billing," of this manual. The resident engineer may approve contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit extra work bill data on a computer report identical to Form CEM-4902A for all Caltrans projects.

Form CEM-4902B, Extra Work Bill - Labor Charges (Stock # 7541-3497-9)

Contractors use Form CEM-4902B, "Extra Work Bill - Labor Charges," for billing extra work. It is used to enter labor charges and other expense subject to labor markup. This form is used with CEM-4902A, "Extra Work Bill Title Page." Details for use are on the back of the form and are also included in Section 5-103E, "Extra Work Billing," of this manual. The resident engineer may approve contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit extra work bill data on a computer report identical to Form CEM-4902B for all Caltrans projects.

Form CEM-4902C, Extra Work Bill - Equipment Charges (Stock # 7541-3498-1)

Contractors use Form CEM-4902C, "Extra Work Bill - Equipment Charges," for billing extra work. It is used to enter equipment charges to the extra work bill. This form is used with CEM-4902A, "Extra Work Bill - Title Page." Details for use are on the back of the form and are also included in Section 5-103E, "Extra Work Billing," of this manual. The resident engineer may approve contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit extra work bill data on a computer report identical to Form CEM-4902C for all Caltrans projects.

Form CEM-4902D, Extra Work Bill - Material Charges (Stock # 7541-3499-3)

Contractors use Form CEM-4902D, "Extra Work Bill - Material Charges," for billing extra work. It is used to enter material charges to the extra work bill. This form is used with CEM-4902A, "Extra Work Bill - Title Page." Details for use are on the back of the form and are also included in Section 5-103E, "Extra Work Billing," of this manual. The resident engineer may approve contractor-designed forms. With prior approval from the Division of Construction, the contractor may submit extra work bill data on a computer report identical to Form CEM-4902D for all Caltrans projects.

Form CEM-4903, Contract Change Order Memorandum (Stock # 7541-3544-0)

Resident engineers use Form CEM-4903, "Contract Change Order Memorandum" in conjunction with Form CEM-4900, "Contract Change Order," to report the necessary engineering and administrative data relative to the change. See Section 5-3, "Contract Change Orders," of this manual for details.

Form CEM-5101, Request for Payment for Materials on Hand
(Stock # 7541-3522-4)

Contractors use Form CEM-5101, "Request for Payment for Materials on Hand," to request payment for materials on hand. Instructions for the form and administrative procedures are covered in Section 3-9, "Measurement and Payment," of this manual.

Form CEM-6001, Project Record - Estimate Request

The resident engineer uses Form CEM-6001, "Project Record - Estimate Request," to request that an estimate be run. See Section 5-103F (1), "Procedure," of this manual for details.

Form CEM-6002, Contract Administration System (CAS) - Report Requests

Use Form CEM-6002, "Contract Administration System (CAS) - Report Requests," to obtain reports available from the contract administration system. See Section 5-103, "The Contract Administration System (CAS)," of this manual for details.

Form CEM-6003, Progress Pay - Estimate Project Initiation or Update

Use Form CEM-6003, "Progress Pay - Estimate Project Initiation or Update," to add new information or to change information in the contract administration system. For details see Section 5-103B, "Project Initiation and Update," of this manual.

Form CEM-6004, Contract Transactions Input (Stock # 7541-3515-0)

Use Form CEM-6004, "Contract Transactions Input," to input estimate data into the contract administration system for the project record and estimate. See Section 5-103C, "Contract Transactions," of this manual for details.

Form CEM-6201, Notice of Potential Claim

Contractors use Form CEM-6201, "Notice of Potential Claim," to submit notices of potential claims to the resident engineer. For details on the use of this form see Section 5-4, "Disputes," of this manual.

Form CEM-6301, Contract Acceptance

Resident engineers use Form CEM-6301, "Contract Acceptance," to document acceptance and the various quantities delivered by the contract. Instructions are on the back of the form. For details on the use of this form see Section 3-710, "Acceptance of Contract," of this manual.

Form CEM-9001 Construction Manual Proposed Change

Caltrans personnel may use Form CEM-9001 "Construction Manual Proposed Change," to submit a proposed change to the *Construction Manual*. Forms should be sent to the Division of Construction.

5-101C Office of Materials Engineering and Testing Services Forms (METS)

Order METS forms by stock number from district warehouses or stockrooms. Find forms without stock numbers on the Caltrans Electronic Form System's (CEFS) Intranet web site: http://adsc.caltrans.ca.gov/CEFS/. The appendix of this manual contains samples the forms that are generated in construction. Forms without stock numbers can also be obtained by contacting METS.

Form TL-0028, Notice of Materials to be Inspected

METS uses Form TL-0028, "Notice of Materials to be Inspected," to assign inspection duties. METS sends copies of these assignment forms to the resident engineer. Sample form not in appendix.

Form TL-0029, Report of Inspection of Material (Stock # 7541-6001-2)

METS will complete Form TL-0029, "Report of Inspection of Material," to confirm the inspection of material to which the inspector has attached inspection release tags or other means of identification. METS mails the report to the resident engineer, who will compare it with inspection tags or markings on delivered materials. Sample form not in appendix.

Form TL-0101, Sample Identification Card

Use Form TL-0101, "Sample Identification Card," to submit samples to METS or district materials laboratories for testing materials other than field samples of concrete (compressive strength) and cement samples.

Form TL-0502, Field Sample of Portland Cement Concrete Sample Card (Stock #7541-6018-8)

Use Form TL-0502, "Field Sample of Portland Cement Concrete Sample Card," to submit compressive strength samples of concrete. Refer to Section 6-3, "Field Tests," for details on marking of samples.

Form MR-0518, Job Cement Samples Record (Stock # 7541-6019-0)

Use Form MR-0518, "Job Cement Samples Record," to submit cement samples for testing. Instructions for the use of this form are found in Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of this manual.

Form TL-0608, Notice of Materials to be Furnished

METS uses Form TL-0608, "Notice of Materials to be Furnished," to notify the manufacturer that a METS inspector has been assigned to inspect a specific item. See Section 6-2, "Acceptance of Manufactured Material and Sampling Methods," of this manual for more details. Sample form not in appendix.

Form TL-0624, Inspection Release Tag

When a METS Inspector has inspected material, the inspector will attach Form TL-0624, "Inspection Release Tag," with lot numbers, inspector's initials, and date of inspection. For materials where it is not practicable to attach tags, the inspector will mark lot numbers on the material in lieu of attaching the tags. Sample form not in appendix.

Form TL-0649, Inspector's Report of Material on Hand

METS uses Form TL-0649, "Inspector's Report of Material on Hand," to verify that material has been inspected and is in acceptable condition. See Section 3-9, "Measurement and Payment," of this manual for details. Sample form not in appendix.

Form TL-3096, Pavement Core Record

The district materials unit uses Form TL-3096, "Pavement Core Record," to record the data on cores that are taken to determine pavement thickness. See Section 4-40, "Portland Cement Concrete Pavement," of this manual for details. Sample form not in appendix.

Form TL-6037, Fabrication Progress Report

DMETS uses Form TL-6037, "Fabrication Progress Report," to notify resident engineers of progress being made on fabrication of various items. See Section 3-9, "Measurement and Payment," for details. Sample form not in appendix.

5-101D Other State Forms

Following is a list of state forms used in contract administration that are not issued by the Division of Construction or METS.

Form DAS-1, Apprentice Agreement

Form DAS-1, "Apprentice Agreement," provides evidence of registration of the contractor's apprenticeship program (Sample form not in appendix). Contractors obtain Form DAS-1 from the *California Department of Industrial Relations, Division of Apprenticeship Standards.*

Form H-ESP-16, Request for Construction Staking (Stock #7541-4542-7)

The contractor uses Form H-ESP-16, "Request for Construction Staking," to request construction staking. The resident engineer and the survey party chief add information to the request. It serves as a record of construction staking and any charges to the contractor for re-staking. For information on construction surveys and use of Form H-ESP-16, see Chapter 12, "Construction Surveys," of the *Caltrans Surveys Manual*.

Form LA-16, Product, Material, or Method Report (For Highway Planting or Erosion Control)

Use Form LA-16, "Product, Material, or Method Report (For Highway Planting or Erosion Control)," to report new products, materials, or methods for erosion control and highway planting. Send the completed report to the district landscape architect and to the Office of State Landscape Architecture. See section 4-2001, "General," of this manual for details.

Form LA-17, Report of Chemical Spray Operations

The contractor uses Form LA-17, "Report of Chemical Spray Operations," to submit the required weekly pesticide application report. See Section 4-2003C (2), "Pesticides," of this manual for details.

Form TR-0019, Notice of Change in Clearance or Bridge Weight Rating

Use Form TR-0019, "Notice of Change in Clearance or Bridge Weight Rating," to report permanent changes to vertical or horizontal clearance for vehicular traffic or permanent changes in bridge permit ratings on divided roadways. See Section 3-705B, "Clearance and Bridge Permit Rating Changes (Permanent)," of this manual for details.

Form TR-0020, Notice of Change in Vertical or Horizontal Clearance

Use Form TR-0020, "Notice of Change in Vertical or Horizontal Clearance," to report permanent changes to vertical or horizontal clearance for vehicular traffic. See Section 3-705B, "Clearance and Bridge Permit Rating Changes (Permanent)," of this manual for details.

Form TR-0029, Notice of Change in Clearance or Bridge Weight Rating

Use Form TR-0029, "Notice of Change in Clearance or Bridge Weight Rating," to report permanent changes to vertical or horizontal clearance for vehicular traffic or permanent changes in bridge permit ratings on undivided roadways. See Section 3-705B, "Clearance and Bridge Permit Rating Changes (Permanent)," of this manual for details.

5-101E Federal Forms

Following is a list of some federal forms that are used in contract administration.

Form FHWA-47M Statement of Materials and Labor Used By Contractors On Highway Construction Involving Federal Funds

The contractor must submit Form FHWA-47M "Statement of Materials and Labor Used By Contractors On Highway Construction Involving Federal Funds," on federal-aid contracts when the amount paid to the contractor is in excess of $1,000,000. Instructions are on the back of the form. Sample form not in appendix. Obtain the form from the United States Department of Transportation, Federal Highway Administration's web site: http://www.fhwa.dot.gov/

Form FHWA-1022 United States Department of Transportation Notice

The contractor must post Form FHWA-1022 "United States Department of Transportation Notice," on each federal-aid highway project in one or more places where it is readily available to all personnel associated with the project. The resident engineer must also post the notice at the Caltrans field office. (Sample form not in appendix). Obtain the form from the United States Department of Transportation, Federal Highway Administration's web site: http://www.fhwa.dot.gov/

Form FHWA-1391 Federal-Aid Highway Construction Contractors Annual EEO Report

The contractor must submit Form FHWA-1391 "Federal-Aid Highway Construction Contractors Annual EEO Report," on all federal aid contracts over $10,000. All subcontractors on federal aid projects whose subcontracts exceed $10,000 must also submit the report. Contractors and subcontractors include project employment data for the last full week of July on the report. Sample form not in appendix. Obtain the form from the United States Department of Transportation, Federal Highway Administration's web site: http://www.fhwa.dot.gov/

Form DOL SF-308 Request for Wage Determination and Response to Request

On federal-aid contracts, request wage rate determinations on the United States Department of Labor Form SF-308, "Request For Wage Determination and Response to Request." Sample form not in appendix. Obtain the form from the United States Department of Transportation, Federal Highway Administration's web site: http://www.fhwa.dot.gov/

Equal Employment Opportunity Is The Law Poster

The contractor must post the "Equal Employment Opportunity Is The Law Poster" on each federal-aid highway project in one or more places where it is readily available to all personnel associated with the project. The resident engineer must also display the poster at the Caltrans field office. Sample form not in appendix. Obtain the poster from the United States Department of Transportation, Federal Highway Administration's web site or the district labor compliance officer: http://www.fhwa.dot.gov/

Form FHWA-1495 Wage Rate Information Federal-Aid Highway Project

The contractor must post Form FHWA-1495 "Wage Rate Information Federal-Aid Highway Project," with the Secretary of Labor minimum wage rate schedule attached, at the jobsite where the workers can easily see it. Sample form not in appendix. Obtain the form from the Federal Highway Administration or the district labor compliance officer: http://www.fhwa.dot.gov/

5-102 Organization of Project Documents

5-102A General

This section describes the uniform filing system for organizing project records and reports. The system uses numbered categories for filing project documents. Use the uniform filing system on all projects.

There are 63 categories in the filing system. There are several unassigned categories. Use them for project documents that do not fit in assigned categories. If necessary, divide a category into subcategories.

Assign the appropriate category numbers to documents filed at a separate location (such as a field office hanging file). The filing system will then be correct when records are brought together after project completion.

Obtain preprinted category labels, stock number 7690-0150-6, from the district warehouse.

5-102B Indexing

Use a category index, similar to the sample shown at the end of this section, or an index of categories that is supplied with the labels, for each project. Post the index in a prominent location.

When the location of a category is separate from the main file, indicate its location on the index under appropriate heading.

5-102C Description of Categories

The discussion below describes the documents that should be included in each category and, for some categories, a recommended order of the documents in the categories.

Category 1, Project Personnel

Include all personnel related records in this category. Suggested subcategories are listed below. On smaller projects, some of the listed subcategories may be combined when the amount of detail shown is not warranted.

- Form CEM-0101, “Resident Engineer’s Report of Assignment”
- Attendance Report
- Overtime Records
- Monthly Time Sheets
- Overtime Requests and Authorizations
- Absence Requests
- Personnel Transfer Records
- Personnel Roster
- Travel Expense Claims and Records
- Individual Personnel File. Use this for a file on each individual containing emergency telephone numbers, experience or training records, among other things.

Category 2, Project Office Equipment and Supplies

In this category, file those documents relating to equipment and supplies. Include records of equipment and supplies that have been received or returned. The subcategories listed below outline the scope of this category.

- Equipment Inventory
- Shipping Records (related shipping and receiving records should be stapled together)
- Receiving Records
- Transfer Requests
- Local Requests
- Automotive Records
- Cash Expenditure Vouchers
- Purchase Orders
- Bills of Lading

Category 3, Equipment and Personnel Cost Reports

In this category, file construction engineering cost reports.

Category 4, Service Contracts

In this category, file those documents related to the project office utilities and services. File requests for service along with all correspondence relating to project office service contracts in an appropriate subcategory. File the receiving records for bills for utilities and services in a "date received" sequence.

It is recommended that a separate subcategory be used for each company or each service agreement. File purchase orders for supplies in Category 2, "Project Office Equipment and Supplies."

The subcategories that may be included in this category are as follows:

- Rent
- Electricity
- Gas
- Telephone
- Water
- Additional service agreements, as required

Do not confuse this category with Category 16, "Utility Agreements," Category 17, "Utility Work Performed," or a subcategory of Category 52, "Charges to Contract Allotment." These are part of the project's construction operations. Category 4 includes only those transactions connected with the resident engineer's office.

Category 5, General Correspondence

In this category, file those letters that do not relate to any other category or subcategory in use. File correspondence concerning a subject that directly relates to some other category in that category. For example file correspondence developed in connection with a contract change order in the contract change order category file.

File correspondence filed in any subcategory in chronological order.

When the volume of correspondence builds up, segregate and divide it into more detailed subject subcategories. When appropriate, transfer correspondence from category 5 to a more specific category. For example, a property owner may object to certain conditions on the project. After considerable correspondence, The resident engineer writes a contract change order to solve the problem. At this point, the resident engineer should transfer all of the correspondence related to the contract change order to the contract change order category file.

A letter might cover subjects in different categories. When the letter relates directly to two subjects, file a copy in each category or cross-reference to the location of the original. Cross-referencing need be only a note describing the letter filed in the appropriate category.

The following are examples of the subcategories in category 5. The number of subcategories will depend on the volume of correspondence. Show all subcategories in the index.

- To district office
- From district office
- To contractor
- From contractor
- Property owners
- Utility companies
- Any additional subcategories that may be required depending on the volume of the correspondence.

Category 6, Safety

File project documents relating directly to safety in this category. Suggested subcategories are shown below:

- Employee Safety
- Contract Documents Relating to Safety
- Correspondence with the Division of Occupational Safety and Health (Cal/OSHA)
- A copy of the contractor's Code of Safe Practices in use for the project

Category 7, Public Relations

File the various documents covering the subject of public relations in this category.

Category 8, Construction Surveys

Use this category for filing all survey documents that do not directly or solely relate to another category.

File Form H-ESP-16, "Request for Construction Staking," in this category. Create subcategories for requests on which staking has been completed and for those where staking has not been completed. Cross-file staking requests that include restaking charges in Category 54, "Deductions from Payment to Contractor."

Category 9, Welding

In this category, file documents relative to welding in accordance with instructions in Section 180, "Welding," of the *Bridge Construction Records and Procedures Manual*.

Category 10, Extra Category Number

Use this extra category number for project documents that do not fit in presently established categories. When used, enter the name of the category on the index sheet.

Category 11, Information Furnished at Start of Project

In this category, file documents related to planning, design, contract funding, advertising, and opening bids. Do not file documents in this category that apply solely or directly to other established categories. This category should contain the following items. Create subcategories as necessary due to the volume of documents.

- Project Report
- Preliminary Report
- Project Expenditure Authorization, (including Supplemental Allotments)
- Detailed Estimate of Project Cost
- Notice of Award of Contract
- Bid Summary Sheets
- Federal Detail Estimate
- Executed Contract, Special Provisions, and Plans
- Notice of Approval of the Contract.
- Environmental Permits
- Bidder Inquiry Information

Category 12, Contractor

Use this category to file the various documents that the contractor is required to submit. Do not use it for general correspondence or documents appropriate to another specific category. The following subcategories suggest the scope of the category:

- Contractor's organization including the designation of the contractor's authorized representative as required by Section 5-1.06, "Superintendence," of the *Standard Specifications*
- Contractor's equipment list

- Contractor's borrow agreements
- List of subcontractors and other project documents concerning subcontracting
- Shop plans, if not filed under another appropriate category
- Falsework plans
- Insurance documents as required in Section 7-1.12, "Indemnification and Insurance," of the *Standard Specifications*

Category 13, Signs and Striping

In this category, file all documents relayed to signing, delineation, and handling public traffic during construction. Suggested subcategories are listed below.

- Layout of Construction Signs
- Detour Design, Striping and Signing
- Traffic Striping Diagrams

Category 14, Photograph Records

File routine photographs and their identification in this category. File photographs relating to claims in Category 62, "Disputes." It is a good practice to take photographs on a monthly basis to document the work during construction. Maintain videotapes and digital photo files in an organized manner. Note the location of these items in this category file.

Suggested subcategories for this category are:

- Before Construction
- During Construction
- After Construction

Category 15, Accidents

In this category, file documents related to accidents. Subcategories may include:

- Caltrans Employee Accident and Injury Reports.
- Caltrans Vehicle Accident Reports.
- California Highway Patrol Accident Reports.
- Local Police Accident Reports.
- Records and Investigations of Public Traffic Accidents.
- Records and Investigations of Contractor Accidents.

Category 16, Utility Agreements

In this category, file those documents that relate to work to be done to utility facilities in connection with the project.

Create subcategories for the various utility companies. Set up second level subcategories when required by the number of documents. The following are examples of subcategories within this category:

- 16.1.1 PG&E Co.—Agreements

- 16.1.2 PG&E Co.—Relocations
- 16.1.3 PG&E Co.—Encroachment Permit
- 16.2 AT&T Co.
- 16.3 Southern Pacific RR Co.

Category 17, Utility Work Performed

In this category, file daily reports and other records of utility facility work. Create the same the primary subcategories as those used in Category 16.

Create second level subcategories when required by the number of documents and the amount of work. For example, where the work would develop just daily reports and receiving records of one utility relocation, these documents could be kept in one subcategory in chronological order. When the same utility company has more than one relocation a more detailed breakdown may be advisable.

Category 18, Agreements

In this category, file agreements (except utility agreements) with third parties or other state or county agencies. The number and levels of subcategories will depend upon the agreements and the nature and extent of the work involved. A list of suggested subcategories follows:

- Right-of-Way Agreements—Without Obligations
- Right-of-Way Agreement—With Obligations
- Forest Service Agreements
- Borrow Agreements (between Caltrans and owner)
- Disposal Agreements (between Caltrans and owner)
- Service Agreements (these are utility service agreements such as for highway lighting)
- Disposal Permits
- Records of Royalty Payments
- Encroachment Permits

File an encroachment permit relating to a utility facility agreement under Category 16, “Utility Agreements.” File an encroachment permit relating to a right-of-way agreement in this category.

Where there are several right-of-way agreements requiring some degree of control, such as right-of-way agreements with obligations, maintain a summary to show the status of these agreements. An example of the status summary headings is shown below:

- The agreement number.
- The location of work to be performed.
- A brief description of work to be done and by whom.
- When the work is completed.
- The contract change order number if the required work is being done by contract change order.

Category 19, Hazardous Waste and Hazardous Materials

File any information regarding the discovery and removal of hazardous waste in this category.

Category 20, Water Pollution Control Plan or Storm Water Pollution Prevention Plan

File all correspondence regarding water pollution control plans (WPCP) or storm water pollution prevention plans (SWPPP) in this category. A list of suggested subcategories follows:

- Approved WPCP or SWPPP
- Amendments to WPCP or SWPPP
- Notification of Construction
- Correspondence
- Inspections by Contractor
- Inspections by Caltrans
- Inspections by Task Force Team
- Notices of Noncompliance
- Annual Certification of Compliance
- Notice of Termination

Category 21, Construction Zone Enhanced Enforcement Program

File documents relating directly to the Construction Zone Enhanced Enforcement Program (COZEEP) in this category. Suggested subcategories are shown below:

- Form CEM-2102, "COZEEP/MAZEEP Task Order."
- Form CEM-2101, "COZEEP Daily Report."
- COZEEP cancellations

Category 22, Traffic Management Information

Use this category to file information related to traffic management. Possible subcategories include:

- Contractor lane closure requests
- Lane closure requests submitted to the traffic management center
- Approved lane closures
- Contractor contingency plans
- Traffic count data

Category 23, Extra Category Number

Use this extra category number for project documents that do not fit in presently established categories. When using an extra category, enter the category number and title in the index.

Category 24, Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises

Use this category for the following:

- Disadvantaged business enterprises (DBE) and disabled veteran business enterprises (DVBE) correspondence.
- The contractor's DBE/DVBE utilization plan.
- DBE and DVBE substitution requests and approvals.
- DBE and DVBE monthly reports.
- Certified rosters.
- Form CEM-2402(S), "Final Report-Utilization of Disabled Veterans Business Enterprises (DVBE).
- Form CEM-2402(F) "Final Report-Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors."
- Other DBE and DVBE related documents.

Category 25, Labor Compliance and Equal Employment Opportunity

In this category, file required labor compliance and equal employment opportunity information. See Sections 8-1, "Labor Compliance," and 8-2, "Equal Employment Opportunity," of this manual for details.

Category 26, Progress Schedule

In this category, file the progress schedule, critical path method submittals, and other related information.

Category 27, Weekly Statement of Working Days

In this category, file Form CEM-2701, "Weekly Statement of Working Days." Also file correspondence relating to contract time in a subcategory of this category.

Category 28, Weekly Newsletter

In this category, file periodic newsletters and reports that are prepared during the project. Include those weekly reports of a general nature pertaining to the progress of the contract.

Category 29, Materials Information and Preliminary Tests

In this category, file materials information and preliminary test reports. Suggested subcategories follow:

- Materials information
- Report of foundation investigation
- Asphalt concrete aggregate (preliminary tests)
- Report of tests on aggregate base (preliminary tests)
- Report of tests on aggregate subbase (preliminary tests)

Category 30, Basement Soil Test Results

In this category, file basement soil test results taken to determine structural section adequacy (taken during design phase).

Category 31, Notice of Materials to Be Used

In this category, file Form CEM-3101, "Notice of Materials to Be Used." Create a system for checking that notices have been received.

Make Form CEM-3101's that contain information for structure items available for use by the structure representative. Consider filing the Form CEM-3101's listing structure items in a separate subcategory of this category.

Category 32, Notice of Materials to be Inspected

In this category, file Form TL-0028, "Notice of Materials to be Inspected."

Category 33, Notice of Materials to be Furnished

In this category, file Form TL-0608, "Notice of Materials to be Furnished."

Category 34, Treated Base

In this category, file documents for cement-treated base, cement-treated permeable base, and asphalt-treated permeable base. Do not include those documents that are to be filed in other specific categories such as 37 and 48.

Use subcategories similar to the examples shown below. Create a numbering system that identifies the category, item and subcategory. For example, 34.26.3 indicates Category 34 "Treated Bases," 26 is the contract item number of the material and also identifies the subcategory, and the 3 is the second level subcategory identifying the particular document.

- 34.26.1 Mix design data, cement-treated base
- 34.26.2 Plant records, cement-treated base
- 34.26.3. Spread records, cement-treated base
- 34.27.1 Mix design data, cement-treated permeable base
- 34.27.2 Plant records, cement-treated permeable base
- 34.27.3 Spread records, cement-treated permeable base
- 34.28.1 Mix design data, asphalt-treated permeable base
- 34.28.2 Plant records, asphalt-treated permeable base
- 34.28.3 Spread records, asphalt-treated permeable base
- 34.4 Certificates of Compliance for materials used in treated bases

Category 35, Asphalt Concrete

In this category, file documents related to asphalt concrete, except those to be filed in other specific categories such as in 37 and 48. Following are suggested subcategories:

- Mix designs and related project documents
- Plant records (other than acceptance tests)

- Spread records
- Certificates of Compliance for materials used in asphalt concrete

Category 36, Portland Cement Concrete (other than structure items)

In this category, file documents related to portland cement concrete. Do not include documents that are to be filed in other specific categories such as 37, 43 and 48. For structure items, the project documents are to be filed in Category 43. See the *Bridge Construction Records and Procedures Manual* for details. Following are suggested subcategories for this category:

- 36.1 Portland cement concrete Pavement
- 36.1.1 Mix Designs
- 36.1.2 Plant Records
- 36.1.3 Certificates of Compliance for materials used in concrete pavement
- 36.2 Portland cement concrete, Class A Structure and minor concrete
- 36.2.1 Mix Designs
- 36.2.2 Plant Records
- 36.2.3 Certificates of Compliance for materials used in Class A structure concrete and minor concrete

Category 37, Initial Tests and Acceptance Tests

In this category, file initial tests and acceptance tests. File documents in each subcategory chronologically unless there is a specific reason for doing otherwise.

Use subcategories similar to the examples shown below. Create a numbering system that identifies the category, item and subcategory. For example, 37.21.3 indicates Category 37 "Acceptance Tests," 21 is the contract item number of the material and also identifies the subcategory, and the 3 is the second level subcategory identifying the particular test result.

- Embankment

  37.10.1 Relative Compaction

- Structure Backfill

  37.14.1 Sand Equivalent

  37.14.2 Relative Compaction

- Aggregate Subbase

  37.21.1 Relative Compaction

  37.21.2 Moisture

  37.21.3 Sieve Analysis

  37.21.4 Sand Equivalent

  37.21.5 Record of Thickness (summarized in the order that the measurements are made)

- Aggregate Base

  37.22.1 Relative Compaction

  37.22.2 Moisture

  37.22.3 Sieve Analysis

  37.22.4 Sand Equivalent

  37.22.5 Record of Thickness (summarized in the order that the measurements are made)

- Asphalt Concrete

  37.31.1 Gradings and sand equivalent (file both in a single subcategory when both results appear on one test report)

  37.31.2 Extraction and Moisture

- Portland Cement Concrete Pavement

  37.42.1 Sand Equivalent

  37.42.2 Cleanness Value

  37.42.3 Sieve Analysis

  37.42.4 Modulus of Rupture

  37.42.5 Penetration Values

  37.42.6 Cement Content

  37.42.7 Profilograph Summary

  37.42.8 Coefficient of Friction

  37.42.9 Other related items

Use Form CEM-3701, "Test Result Summary" for each item of testing, and file it in the appropriate subcategory of this category.

Bills of lading and copies of sample identification tags may be filed in this category temporarily and discarded when their respective test reports are filed.

File test results for items assigned to Office of Structure Construction personnel in this category in accordance with instructions contained in the *Bridge Construction Records and Procedures Manual*.

Category 38, Quality Control, Quality Assurance

In this category, include all documents relating to quality control, quality assurance. Create a subcategory system to include the following:

- The contractor's quality control plan
- Mix designs
- The contractor's quality control tests
- Caltrans verification tests
- Pay factor calculations
- Copies of related correspondence

Category 39, Materials Testing Certification of Employees

In this category, file copies of certifications of the employees performing acceptance tests.

Category 40, Field Laboratory Assistant Reports to Resident Engineer

In this category, file chronologically any reports made out by the project's materials tester. For more than one type of report, such as a report and a summary form, provide separate subcategories.

Category 41, Report of Inspection of Material

In this category, file Form TL-0029, "Report of Inspection of Material." Create a subcategory for each contract item requiring inspection at the source by a Office of Materials Engineering and Testing Services inspector.

Place a summary sheet containing the date of inspection, quantity inspected, accumulated quantity, and lot numbers in each subcategory. Use form similar to that used by the Office of Structure Construction (Form DH-OS-C52, "Materials Release Summary"). The primary purpose of this form is to check that materials used in the work have been inspected.

Staple Form TL-0624, "Inspection Release Tag," removed from materials received on the project, to the report of inspection on a letter-size sheet of paper and file it in the appropriate subcategory of this category. The sheet should contain the name of the engineer who removed it and the date removed. When lot numbers are marked on the items, note the observed lot number on the related Form TL-0029.

When the Form TL-0029 includes material for more than one item, include a reference on the summary sheet showing the file location of the TL-0029.

File test reports (usually on Form CEM-4102, "Material Inspected and Released on Job") that cover material sampled on the job in lieu of source inspection in the appropriate subcategory of this category, not in Category 37.

File reports of inspection or certificates of compliance for materials assigned to the structure representative in this category in accordance with instructions contained in *Bridge Construction Records and Procedures Manual*.

Category 42, Material Plants

In this category, file Form CEM-4202, "Material Plant Safety Checklist" and all other project documents pertaining to material plant inspections.

Category 43, Concrete and Reinforcing Steel

In this category, file documents relative to concrete and reinforcing steel in accordance with instructions in the *Bridge Construction Records and Procedures Manual*.

Category 44, Extra Category Number

Use this extra category number for project documents that do not fit in presently established categories. When using an extra category, enter the category number and title in the index.

Category 45, Resident Engineer's Daily Reports

In this category, file Form CEM-4501, "Resident Engineer's Daily Report/Assistant Resident Engineer's Report" and the structure representative's daily report.

Category 46, Assistant Resident Engineer's Daily Reports

In this category, file Form CEM-4601, "Assistant Resident Engineer's Daily Report."

Subcategories may be used. They may vary depending on the complexity of the project and the desires of the district. The resident engineer and the structure representative must agree on the subcategories before the start of work. Follow the procedures described below to establish the subcategories.

1. Reports Covering Contract Items

   Create a subcategory for each major operation so that all items affecting the major operations are grouped together. An example of a system for a relatively large project follows:

Category and Subcategory Number	Operations	Contract items Involved in the Operation
46.2	Clearing and Grubbing	5
46.3	Rdwy. Exc., Ditch Exc. Aggregate Subbase	8,13,11,15,22
46.4	Salvage Fence, New Fence Gates	2,78,79,80
46.5	Guard Railing, Markers, Barricades	1,4,82,83,87
46.6	AB,CTB	23,24
46.7	AC Slurry Seals, Dikes	28,29,30,31,32
46.8	Concrete Paving	35,36,37
46.9	Curbs and Sidewalks, Slope Paving, Curb Drains, Spec. Gutter Drains	73,74,76,77
46.10	Minor Str., Precast MH and DI, Reinf. Steel, Misc. Iron and Steel	42,69,70,46,75
46.11	RCP, CMP, SSP Arch, Drainage Gates, Under/Down Drain, Str Exc., Str. Backfill	9,11,58
46.2	Preparing Slopes, Straw	16,17,18,19,20
46.13	Permanent Signing	52,53,54,55
46.14	Hwy. lighting and sign illumination	88
46.15	Finishing Roadway	21
46.16	Structure #1	89,90,91
46.17	Structure #2	89,90,91

Modify the above breakdown to conform to the size and nature of the project. Make the breakdown narrow enough so that reports covering any particular contract item may be obtained with ease. Review the breakdown to ensure it includes all contract items.

Make as many daily reports as necessary to cover all contract item work in the appropriate subcategories.

As indicated in the above example, set up a separate subcategory for each structure.

2. Reports Covering Extra Work

   Pending receipt of the contractor's billing, file chronologically the original and one copy of Form CEM-4601, "Assistant Resident Engineer's Daily Report," covering extra work in a subcategory of this category. After receiving the extra work bill report and approving payment, record the extra work bill number on both copies of the daily report covering the extra work. Keep one copy of the daily report in this chronological file and use it to detect future billings for the same work. File the second copy with the daily extra work report in Category 49.

   Extra work bills for material should show the date the material was supplied or placed and referenced to the invoice so that the particular material may be readily identified. Keep a summary of invoices paid and use it as a check against duplicate payment.

The specific system used for filing resident engineer's and assistant resident engineer's daily reports is optional (except for extra work). However, Category 45 and 46 must be used and the file index must clearly show the specific system being used.

Category 47, Drainage Systems

In order to maintain a record of contract items for drainage systems, use Form CEM-4701, "Drainage System Summary."

Use a Form CEM-4701 for each drainage system shown on the drainage quantity plan sheet. The preliminary work required to set up each system summary includes entering the contract number, the system number, planned station and description of the system, and the preliminary or planned quantities which are entered from the drainage quantity plan sheet.

The assistant resident engineer describes progress on each drainage system in the daily report and enters estimates of work completed on the "Progress Record" portion of the drainage system summary.

Enter the quantity of work completed during an estimate period or near the end of the estimate period for each item in the "Estimate of Work Completed" portion of the drainage system summary. The quantities of work completed may then be entered on the Form CEM-6004, "Contract Transactions Input," and paid on the next estimate. Use the extra column next to the item quantity column to identify the Form CEM-6004 page and line number where the quantity was entered.

After all items for a particular drainage system have been calculated and checked, the final quantities are entered in the row labeled, "Actual Q."

In order to keep track of and reduce the number of drainage system summaries that have to be checked at the end of each estimate period, divide the category into the following subcategories:

- 47.1 Before Work Starts
- 47.2 Staked and Being Worked On
- 47.3 Drainage System Complete, Final Quantities Not Complete
- 47.4 Final Quantities Completed

Example:

47.1 Before Work Starts.

Place the preliminary drainage summaries in this subcategory in numerical order. Each drainage system summary will remain in this subcategory until work starts on that system.

47.2 Staked and Being Worked On.

When a drainage system is staked, transfer the drainage summary sheet from index 47.1, "Before Work Starts," to index 47.2, "Staked and Being Worked on." Transfer the individual quantity calculation sheets with the drainage summary.

47.3 Drainage System Complete, Final Quantities not complete

After all work is completed on a particular drainage system, transfer the summary sheet with its calculation sheets to this subcategory. Removing the summary from the preceding index (47.2, Staked and Being Worked On), precludes having to go through completed structure summaries at the end of each estimate period when making entries of work completed. Determination of pay quantities should be made as soon as possible after work on the system is complete.

47.4 Final Quantities Completed

After all quantity calculations for a drainage system are completed and the adjusted quantities entered into the project record, transfer the summary sheet and its calculation sheets to this subcategory.

Since all drainage quantity calculation sheets will remain filed in Category 47, some item-numbered folders in Category 48 may have no documents.

Category 48, Contract Item Quantity Documents

In this category, file source documents supporting contract item quantities. List the subcategories in category 48 by contract item number order. Identify individual calculation sheets for the various contract items in the following manner. A quantity sheet with the number 48-14-2 indicates that it is sheet number 2 covering contract item number 14 and filed in Category 48, "Contract Item Quantity Documents." Some drainage item quantity documents may be filed in Category 47.

Category 49, Contract Change Orders

In this category, file contract change orders and supporting documents in numerical order.

Subcategories of this category are change order numbers in numerical order. Contained within each subcategory are:

- The Form CEM-4900, "Contract Change Order," Form CEM-4903, "Contract Change Order Memorandum," and any accompanying correspondence.
- Form CEM-4901, "Contract Change Order Input."
- Daily extra work bills and reports matched with assistant resident engineer's daily reports

Two additional subcategories may be:

- The *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book(s) applicable to the contract.
- Equipment rental rates and memos covering rates not shown in the *Labor Surcharge and Equipment Rental Rates Book*.

Category 50, Adjustment in Compensation Calculations

In this category, file project documents and calculations to support adjustments in compensation.

After a contract change order is written, the supporting project documents may be transferred to the contract change order file or remain in this category. Provide cross references between categories 49 and 50 when the supporting documents and calculations remain in category 50.

List the subcategories under this category by contract item numbers.

Category 51, Materials on Hand

In this category, file Form CEM-5101, "Request For Payment for Materials on Hand", the related evidence of purchase, and any other project documents supporting material on hand payments.

Category 52, Charges to Total Contract Allotment

In this category, file the documents related to and supporting charges to the contract allotment for materials and services supplied by Caltrans.

Divide the category into the subcategories indicated below:

- State Furnished Material And Expenses.

  In this subcategory, file the contractor's letters requesting delivery of state furnished materials. Also, file the receiving records or other records of material furnished by Caltrans. When state furnished material is received as evidenced by a shipping record and a receiving record, file the related shipping and receiving records together.

- Service Contracts.

  In this subcategory file, supporting documents and records of project related services. These are not the service contracts connected with the project office.

Category 53, Credit to Contract

In this category, include a subcategory to keep a record of any salvaged or surplus material. Also set up a subcategory for copies of daily extra work reports which cover repair of damage to state property by third parties (see "Reports of Damage to State Highway Property" in the *Caltrans Safety Manual*).

Credit received for salvaged or surplus material or repair of damage is not applied to the contract allotment and the project is not given credit for any additional money to spend.

Category 54, Deductions From Payment to Contractor

In this category, file documents related to deductions from payments to contractors. Possible subcategories include the following:

- Royalties on material.
- Materials bought for the contractor by Caltrans.
- Laboratory testing done for the contractor (see Section 2.01, "General," of the *Standard Specifications*).
- Engineering and inspection charged to the contractor (see Section 3-506, "Lines and Grades," of this manual for restaking charges).
- Costs of damaged or missing state-owned signs.
- Railroad flagging charges.
- Noncompliance with the equal employment opportunity provisions of the contract.
- Liquidated damages (See Section 3-908, "Deductions," of this manual.
- Any other deductions. (See Section 3-9, "Measurement and Payment" of this manual.)

Categories 55 through 58, Extra Category Numbers

These are extra numbers that may be used for project documents that do not fit in presently established categories. When used, enter them on the index sheets.

Category 59, Bridge Estimate Data

In this category, file the bridge estimate data as covered in the *Bridge Construction Records and Procedures Manual*.

Category 60, Project Status Sheets

In this category, file the "Project Record Item Sheets." Subcategories of this category are estimate numbers in numerical order. The subcategories contain documents resulting from the computerized contract administration system. Only the most current results need to be retained. Possible subcategories are:

- Project Record Item Sheets
- Form CEM-6003, " Progress Pay - Estimate Project Initiation or Update"
- Estimate Verification Form.

- Form CEM-6001, “Project Record - Estimate Request”
- Form CEM-6004, “Contract Transactions Input”
- Status of Contract Items
- Status of Contract Change Orders
- Contract Change Order Master Listing
- Daily Extra Work Report Edit Messages
- Form CEM-6002, “Contract Administration System (CAS) - Report Requests”

If desired, some of the above project documents (other than the “Project Record Item Sheets”) may be filed in extra category numbers.

Category 61, Project Record-Estimate and Project Status

In this category, file monthly estimate output documents.

The suggested subcategories of this category are:

- Progress Payment Voucher
- Project Record-Estimate and Project Status
- Estimate Processing Results

Category 62, Disputes

In this category, file notes, photographs, information, and other project documents that may be necessary to establish facts with respect to a dispute. Include any documents that may be related to a dispute in this category or briefly describe and cross-reference them.

Number notices of potential claims in chronological order. These numbers may then be used for subcategories.

The scope of this category may vary considerably, depending upon the nature and circumstances of the dispute. The following types of documents indicate the type of information that should be included:

- Form CEM-6201, “Notice of Potential Claim”
- Acknowledgment of the contractor’s dispute
- Disputes Review Board Agreement
- Contractor’s claim for a time extension (cross-reference to Category 27)
- Acknowledgment of the contractor’s claim for time extension
- Other correspondence relating to disputes
- Photographs pertaining to disputes

Category 63, Project Completion Documents

In this category, file documents related to the completion of the project. The following are suggested subcategories:

- Form CEM-6301, “Contract Acceptance”

- Form FHWA-47M, “Statement of Materials and Labor Used by Contractors On Highway Construction Involving Federal Funds”
- Materials certification
- Punchlist

5-102D Category Numbers And Headings

Category No.	Heading
1	Project Personnel
2	Project Office Equipment and Supplies
3	Equipment and Personnel Cost Reports
4	Service Contracts
5	General Correspondence
6	Safety
7	Public Relations
8	Construction Surveys
9	Welding
10	(Extra category number)
11	Information Furnished at Start of Project
12	Contractor
13	Signs and Striping
14	Photograph Records
15	Accidents
16	Utility Agreements
17	Utility Work Performed
18	Agreements
19	Hazardous Waste and Hazardous Materials
20	Water Pollution Control Plan or Storm Water Pollution Prevention Plan
21	Construction Zone Enhanced Enforcement Program
22	Traffic Management Information
23	(Extra Category Number)
24	Disadvantaged Business Enterprises and Disabled Veteran Business Enterprises
25	Labor Compliance and Equal Employment Opportunity
26	Progress Schedule
27	Weekly Statement of Working Days
28	Weekly Newsletter

29	Materials Information and Preliminary Tests
30	Basement Soil Test Results
31	Notice of Materials to Be Used (CEM-3101)
32	Notice of Materials to be Inspected (TL-0028)
33	Notice of Materials to be Furnished (TL-0608)
34	Treated Base
35	Asphalt Concrete
36	Portland Cement Concrete (other than structure items)
37	Initial Tests and Acceptance Tests
38	Quality Control Quality Assurance
39	Materials Testing Certification of Employees
40	Field Laboratory Assistant Reports to Resident Engineer
41	Report of Inspection of Material
42	Material Plants
43	Concrete and Reinforcing Steel
44	(Extra category number)
45	Resident Engineer's Daily Reports
46	Assistant Resident Engineer's Daily Reports
47	Drainage Systems
48	Contract Item Quantity Documents
49	Contract Change Orders
50	Adjustment in Compensation Calculations
51	Materials on Hand
52	Charges to Total Contract Allotment
53	Credit to Contract
54	Deductions from Payment to Contractor
55-58	(Extra category numbers)
59	Bridge Estimate Data
60	Project Status Sheets
61	Project Record-Estimate and Project Status
62	Disputes
63	Project Completion Documents

5-102E Alphabetical Listing Of Categories

Heading	Category No.
Accidents	15
Adjustment of Compensation Calculations	50
Agreements	18
Asphalt Concrete	35
Assistant Resident Engineer's Daily Reports	46
Basement Soil Test Results	30
Bridge Estimate Data	59
Treated Base	34
Charges to Total Contract Allotment	52
Concrete and Reinforcing Steel	43
Construction Surveys	8
Construction Zone Enhanced Enforcement Program	21
Contract Change Orders	49
Contract Item Quantity Documents	48
Contractor	12
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5-103 The Contract Administration System (CAS)

5-103A General

This section describes the Contract Administration System (CAS), sometimes referred to as "the progress pay system." The primary purpose of this computer system is to help administer Caltrans construction projects. Various functional units within construction update and maintain records on individual contracts in CAS from the award and approval of the contract through to the completion and final payment.

CAS is one of three subsystems of the Project Information System and Analysis (PISA). The three subsystems of PISA make up the primary computer system that Caltrans uses for tracking contract capital costs. These subsystems are: planning and design, bidding and award, and project construction. In essentially a straight line, each module of PISA passes data to the next module as a project progresses from conception to completion. See Table 5-1, "Contract Administration System, Systems Interface," for a general overview of how CAS relates to the other components of the Caltrans computer system used for tracking and paying contract capital costs.

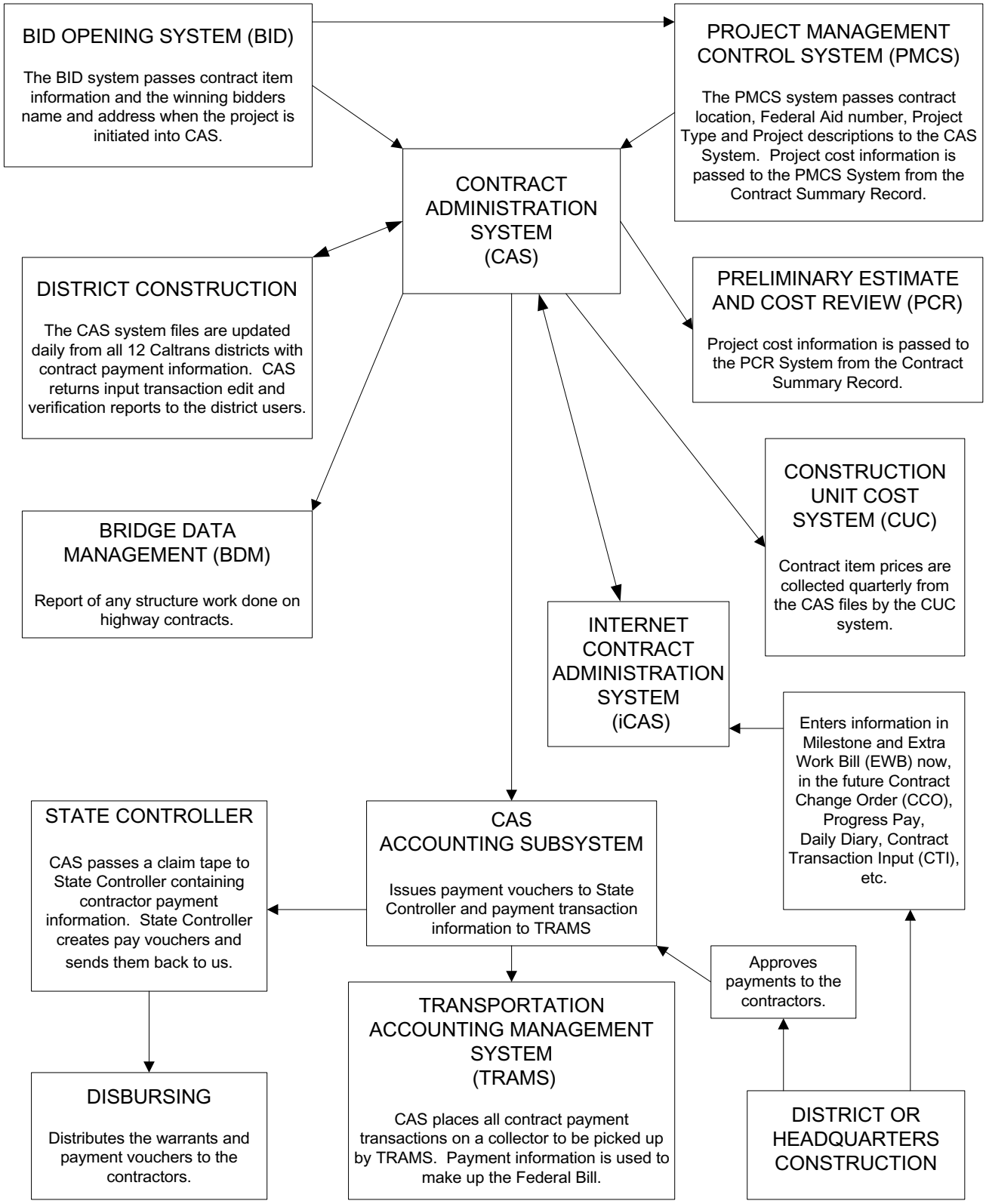
CAS is also composed of separate modules, each of which accomplishes a distinct function. The following are the most common of CAS's many modules:

- Project initiation and update
- Contract transactions
- Contract change order
- Daily extra work report
- Project record estimate
- Reports
- Online update and inquiry

Resident engineers use these modules to do the following:

- Account for quantities from source documents
- Account for change orders and payments for extra work
- Determine the status of the projects' financing
- Authorize payments to contractors

Table 5-1.1 Contract Administration System, Systems Interface



5-103B Project Initiation and Update

When Caltrans has determined the lowest responsible bidder, the Office of Office Engineer will transfer project data from the Bid Opening System to CAS. Usually, this data transfer will occur before awarding the contract and before determining the total allotment. When this information about the award and total allotment becomes available, the Division of Construction will then update the computer file (by adding to or changing existing information).

Immediately after the new contract information in the computer file has been transferred from the Bid Opening System, the data is available to the district for processing. The district must then update the file with district information such as the resident engineer's name and address, the bridge representative's name, and the project's password. To perform the update, the district uses Form CEM-6003, "Project Pay—Estimate Project Initiation or Update" which is explained in more detail under the heading "Filling Out Form CEM-6003," below.

The result of the district's file update will be a dummy Form CEM-6001, "Project Record-Estimate Request," and a contract contents report, which lists contract items. The form and report should be checked thoroughly and any discrepancies brought immediately to the attention of the Division of Construction progress pay coordinator.

During a contract's life, the district must maintain the accuracy of its information by using Form CEM-6003 for updates and changes.

5-103B (1) Completing Form CEM-6003, "Project Pay-Estimate Project Initiation or Update"

The purpose of Form CEM-6003 is to add new information, or to change information, in the computer file. The computer program will accept such changes only for contracts in your own district.

Except for the "Project Key," complete only the data fields that you wish to update. The computer program will ignore blank fields and will place the data from the completed fields in the file whether or not such information is already on file. Fields left blank on the input form do not change what is in the file.

Ensure the data you enter on the form conforms to these rules, listed by data field as follows:

5-103B (1a) Project Key

Enter the letter "U" under "FB," and in the remaining spaces, enter the district and contract number.

5-103B (1b) Card type C05 (each field is independent and can be updated separately)

For the following data fields under card type C05, do the following:

- Resident engineer's phone number.
- Responsible unit: The responsible unit may range from 501 to 545. Warning: Until this number is in the computer file, progress pay estimates cannot be processed.
- Date work started: Enter the date the contractor began work on the job site. If work has not begun, leave this field blank and submit an update when work begins.

- Estimated date for completion: Enter your best estimate, not the calculated completion date. When progress estimate requests are submitted, this date is updated.
- Password: Use of this feature is optional. Enter any combination of six characters. The characters may be alphabetic, numeric, or one of the following special characters: *, /, =, (,), +, -, @, #, %, &. Once established, this password is required when you file, among other things, contract item payments, using Form CEM-6004, "Contract Transactions Input." The password will restrict access to the computer files.
- Suspension or reactivation: If a contract is suspended, enter the date of suspension and "S" in the "SR" column. When the suspended contract is reactivated, enter the date of reactivation and "R" in the "SR" column. You only have 30 calendar days from the suspension or reactivation date to enter this information into the computer.
- Plant establishment: For projects requiring retentions be held at 5 percent for the contract's life, enter an "X" in the "PE" column.
- Begin construction date: Enter the date that contract time begins, usually 15 calendar days after the approval date. This is the date used to calculate the number of working days that determine satisfactory progress and the percent of time elapsed.

5-103B (1c)Card type C06 to C08

Resident engineer's mailing address: On the first line, enter the resident engineer's last name first, followed by a comma. Then enter a space and the first name, followed by a space and middle initial (SMITH, John C.). On the second and third lines, enter the mailing address of the construction field office. Warning: The computer program treats all three lines as a single "data field." If you need to change this field, you must reenter all three lines.

5-103B (1d) Card type C09 to C14

Contractor's name and address: The computer file contains two addresses, the local address and the contractor's legal name style address. The State Controller mails progress payment checks to the legal name style address. Only the Division of Construction progress pay coordinator can change this address. The district must keep the local address current.

Enter the contractor's name on line C09, and as necessary, continue the name on lines C10 through C12. Leave unused lines blank.

Enter the contractor's local address on lines C13 and C14. Also enter the contractor's local phone number on line C14. Warning: You must enter the entire name and address each time you wish to update any or all of these lines. You cannot update a single line.

5-103B (1e) Card type C15

For the following data fields under card type C15, do the following:

- Structure representative's name: If the contract requires structure work, enter the structure representative's name even if it is the same name as the resident engineer's. Enter only the last name and first initial (SMITH, J.)

- Structure responsible unit: This unit is the source unit that the Office of Structure Construction uses to code its time sheet. The unit may range from 550 to 599.
- Original authorized amount for structure work: At the contract's start, the resident engineer and the structure representative must determine the initial value of the required structure work. This value should include any portion of the contract item for mobilization that will be claimed as structure work. Warning: If this amount is not on file, the Office of Structure Construction cannot obtain any reports for this contract.
- Structure mobilization percentage: Enter, to the nearest whole percent, the portion of the contract item for mobilization that will be claimed as structure work.
- Structure completion: Enter a "C" to indicate the completion of structure work.

5-103B (2) Processing

CAS analyzes the changes made to the computer file and does the following:

- CAS notes whether the district is updating the "Responsible Unit" field for the first time. If so, CAS prints a dummy Project Record-Estimate form and a Contract Contents Report.
- If this update is not the first update, CAS prints only the first page of the Contract Contents Report. CAS prints the dummy Project Record-Estimate form only if the contractor's name and address field has been changed.
- CAS also prints a listing of update requests, which is a summary report of all fields that have been updated in this run.

5-103C Contract Transactions

The majority of all data submitted to CAS will be contract transactions from the resident engineer on Form CEM-6004, "Contract Transactions Input." Contract transactions are divided into the following three categories:

- Contract item transactions: These consist of five types of transactions that refer to contract items.
- Miscellaneous transactions: These consist of four types of transactions to handle general project needs.
- Contract change order transactions: These consist of three types of transactions that refer to contract change orders.

The Contract Transaction Processing Module processes this total of 12 transaction types. Together with the services that the CCO and DEWR Processing Modules perform, these modules are sufficient to generate contract records that provide control of progress payments and track the financial status of the contract.

5-103C (1) Transaction Types

The following describes, by category, the 12 possible transaction types:

5-103C (1a) Contract Item Transactions

CAS provides five different ways to refer to a contract item in Form CEM-6004, "Contract Transactions Input." Another way is by including the item as part of a contract change order. This will cause the approved quantity to be adjusted

automatically. Thus, you do not have to account for status changes due to contract change orders. You can reference contract items through the following contract item transactions:

- Contract item payment: Make item payments by posting line entries to Form CEM-6004 in any random order. Indicate bridge items by entering "B" in the proper column. If you use the report entitled *Bridge Quantities by Structure*, you will also need to enter the structure number in accordance with instructions in Volume I, Section 6, of the *Bridge Construction Records and Procedures Manual*.
- Contract item quantity balance: You may adjust the authorized quantity if necessary by submitting quantity balances as line entries on Form CEM-6004. You might need to make this type of transaction for various reasons. For example, a need might exist because of an incorrect engineer's estimate for a contract item that would have a major impact on the contingency balance. This transaction type adjusts the authorized final cost for your project, as we will show in our later discussion of progress pay estimates.
- Contract item anticipated change: This transaction's purpose is to give the engineer a method to allocate project funds to a specific contract item based on knowledge of anticipated additional or decreased work. Such transactions affect the estimated final quantity for the item and also the estimated final cost for the project. The effect of these transactions is cumulative. If additional work is authorized by contract change order, a reversing entry is necessary.
- Contract item final balance: When work is completed on a contract item, you should enter this fact into the system. This entry will mark the item in the computer file as "Complete." On all subsequent progress pay estimates, the authorized quantity and the estimated final quantity will default to the amount paid to date, thus automatically balancing out the item. Additional item payments may be made, and the system will continue to balance the contract items.
- Contract item final balance ("Reopen"): This transaction allows you to reverse the status of the contract item from "Complete" to "Active." For example, you would use "Reopen" to change an incorrect entry that showed the item was complete.

5-103C (1b) Miscellaneous Transactions

The four transaction types listed below comprise "miscellaneous transactions," the second category of contract transactions:

- Anticipated change: Use this transaction to record anticipated additional or decreased work when it is not possible or desirable to tie the anticipated change to a specific contract item or contract change order. These transactions are not cumulative and will affect the project's estimated final cost only on the next progress pay estimate to be generated.
- Material on hand payments: These transactions are placed in the computer file, and their sum will appear on the next progress pay estimate that generates payment. For more information about materials on hand, see Section 3-9, "Measurement and Payment," of this manual.

- State-furnished materials allotment transfer: Use this transaction to increase or decrease the value of the state-furnished materials allotment for your contract. The construction allotment will automatically adjust. To increase the state-furnished materials allotment, enter a positive number. (This type of entry will decrease the contingency balance.)

- Total allotment changes: Use this transaction to enter into the system any supplemental allotment that increases (or decreases) your contract's total allotment. The total allotment in the computer file will adjust automatically as will the construction allotment. The construction allotment is defined as the total allotment less the state-furnished materials allotment.

5-103C (1c) Contract Change Order Transactions

The three transaction types listed below comprise "contract change order transactions," the final category of contract transactions:

- Contract change order anticipated change: This transaction has the same effect as does the contract item anticipated change except that a contract change order is being changed.

- Contract change order final balance: This transaction has the same effect as does a contract item balance. When work on a contract change order is finished, mark it "Complete" by entering this transaction. As with contract items, additional extra work bills may be paid, and the system will continue to balance the contract change order.

- Contract change order final balance ("Reopen"): This transaction allows you to reverse the status of the contract change order from "Complete" to "Active."

5-103C (2) Completing Form CEM-6004, "Contract Transactions Input"

The engineer will use Form CEM-6004 more often than any other form in CAS. Page 2 of the form provides instructions for completing it, and this section contains a complted sample of the form. See Example 5-1.2, "Contract Transaction Input."

We cannot overemphasize the importance of legible entries that conform to the instructions for completing the form. Also, because of the high volume of transactions, make your entries on Form CEM-6004 as soon as the information becomes available. Partially filled pages are acceptable.

The sample form in this section shows some transactions. Note that leading zeros are not required in the numeric fields and that the plus sign is not required in the +/- columns. The following instructions are for the fields common to all transactions:

- Enter the district, contract number, password (if used), and page number. When assigning a page number, be careful because duplicate numbers will cause all transactions on the page to be rejected. You must complete these fields.

- Enter the posting date.

- Enter the source document description. If the transaction type refers to a project source document, (for example, a calculation sheet or a scale sheet), enter into the form's description column an adequate description of the source

document. The source document must cross reference to Form CEM-6004. Post the page number, line number, and posting date from Form CEM-6004 to the source document. See Example 5-1.1, "Quantity Calculation," for a typical source document.

- Note: The last six characters of the source document description can be the structure number if this item concerns structure work.
- Mark the structure field with the character "B" if this transaction concerns "structure work." Otherwise, leave the space blank. If you use the report entitled *Bridge Quantities by Structure*, you will also need to enter the structure number in accordance with the instructions in Volume I, Section 6, of the *Bridge Construction Records and Procedures Manual*.

The form's remaining fields are divided into two sections, "Contract Item Entries," and "All Other Entries." If you make any entry in one or more fields of one of the sections, all fields in the other section must be left blank. A single line entry cannot serve double duty.

5-103C (2a) Contract Item Entries

Each type of contract item transaction has its own format. Fill in the various fields as shown on page 2 of Form CEM-6004. The following are the rules for making contract item entries:

- Quantity balance transactions:
  1. Lump sum items cannot be quantity balanced. If you attempt to quantity balance them, the transaction will be rejected.
  2. If the quantity balance is greater than the bid quantity, a warning message is issued.
  3. If the value of the quantity balance exceeds $100,000, a warning message is issued.
  4. The new authorized quantity is calculated. If it is negative, the transaction will be rejected.
  5. If the new authorized quantity is less than the total payment for the next estimate, a warning message is issued. Take appropriate action on this warning, such as estimating the final quantity and inputting the increase, covering the increase by change order, or requesting the computer to final balance the item. Such action is necessary to keep the project's status of funds current.
- For item final balance and item final balance ("Reopen"), the item status is set to "Complete," or "Active," respectively. The system does not check to see if the item is a lump sum item or a final pay item.
- Item anticipated quantity change:
  1. If the anticipated quantity change is greater than the bid quantity, a warning message is issued.
  2. If the value of the anticipated quantity change exceeds $100,000, a warning message is issued.
  3. A new estimated final quantity is calculated. If this estimated final quantity is negative, a warning message is issued.

4. If the new estimated final quantity is less than the total payment for the next estimate, a warning message is issued.

- Item payment:

  1. Any transactions for the item “Mobilization” are rejected.
  2. Any transactions for a void item will be rejected.
  3. If the payment quantity is greater than the bid quantity, a warning message is issued.
  4. If the value of the payment quantity exceeds $100,000, a warning message is issued.
  5. The new total payment for the next estimate is calculated. If the total is negative, the transaction is rejected. (Negative transactions under “This Estimate” will be accepted.)
  6. If the contract item is a lump sum item and the total payment for the next estimate would exceed 100 percent, the transaction is rejected.
  7. If the contract item is not a lump sum item, the new total payment for the next estimate is compared to 125 percent of the bid quantity and the authorized quantity. Warning messages are issued if the total payment is more than one or both of these.

If the system issues any warning or rejection messages while it processes transactions for a contract item, the complete status of the item will be printed on the Contract Transactions Input Edit report before the system begins processing the next contract item. Use this printout to determine the reason the system issued the message.

- Percentages for lump sum quantity payments must be expressed as decimals. Only three decimal places are available. If 5 percent is to be paid, it must be entered as 0.050; (5.00 is 500 percent).

5-103C (2b) Miscellaneous Transactions

The following are the rules for making miscellaneous transactions:

- Anticipated changes:

  1. If the amount anticipated exceeds $100,000, a warning message is issued.
  2. If the amount anticipated exceeds 10 percent of the construction allotment, a warning message is issued.

- Material on hand payments:

  1. If the amount exceeds $100,000, a warning message is issued.
  2. If the amount is negative, a warning message is issued. (The system assumes that this is a correcting entry to a previous transaction accepted by the system and not yet processed for payment.)
  3. A total is calculated for payment for the next estimate. This is the sum of all transactions since the last estimate. If the total is negative, a warning message is issued.

- State-furnished materials allotment transfer:
  1. If the amount of the transfer exceeds $100,000, a warning message is issued.
  2. A new total is calculated for the state-furnished materials allotment. If it is negative, the transaction is rejected.
- Total allotment changes:
  1. If the amount exceeds $100,000, a warning message is issued.
  2. If the amount exceeds 10 percent of the total allotment, a warning message is issued.
  3. If the amount of the change is negative, a warning message is issued.
  4. A new total allotment is calculated. If the amount is negative, the transaction is rejected.
  5. If the new total allotment is less than the total paid to date on the last estimate, a warning message is issued.

5-103C (2c) Contract Change Order Transactions
The following are the rules for contract change order transactions:

- For the contract change order anticipated change, the new estimated final cost is computed for the contract change order and reported. The system does not do any checking.
- Contract change order final balance and final balance ("Reopen"):
  1. The contract change order status is set to "Complete," or "Active," respectively. The system does not do any checking.
  2. For a contract change order final balance ("Reopen"), the word "Reopen" must be left-justified.

5-103C (2d) General
The Contract Transactions Processing Module will sort your transactions into order, will edit each transaction for reasonableness and conformance to this manual, and will either accept or reject each transaction. From this processing, the system will issue a report entitled "Contract Transactions Input Edit." This report will list the disposition of each line entry that you submitted. A comprehensive set of warning messages exists. Do not ignore warning messages on the report.

Do not use the same page and line numbers again.

You will find a summary on the last page of the Contract Transactions Input Edit report. The summary lists each Form CEM-6004 page that was processed and the numbers of transactions on that page that were accepted, for which warnings were issued, or that were rejected. Any missing line numbers on the page (breaks in the sequence of line numbers) will be printed. Use this list to ensure that all the transactions were entered into the system.

Examine the remainder of the report. You must respond to rejected entries and possibly to warnings.

5-103C (2e)Audit Trail

In any accounting procedure, it is necessary to link transactions to the specific source documents that generate the transactions. This linking is called an audit trail. Contract change orders and daily extra work reports carry unique identifying numbers that CAS uses in its processing. Here, a good audit trail is automatic. However, contract transactions are different since there is no automatic reference to a unique source document.

CAS provides methods of cross-reference. You are responsible for an adequate audit trail. Note that Form CEM-6004 is an intermediate document in this respect.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

QUANTITY CALCULATIONS

CEM-4801 (REV 11/1992) CT# 7541-3520-0

SHEET OF

JOB STAMP

07-1381U4
07-LA-210-47.5/57.3
Fed. No.: None

ITEM 8 Temp. Railing (Type K)	FILE NO. 48-8-2
LOCATION Ramp 3	SEGREGATION YES ☐ NO ☐
CALC. BY I.M. Engineer	DATE
CHK. BY U.R. Wright	DATE

Field Measurement: ✓
Field Counted:
Final Pay Item:

Estimated Quantity: 450
Unit of Measure: meter
Unit Price: $20.00
75%= 337.5
125%= 562.5

Remarks or Other Calculations:

152.4 meters placed on 5-03-01 at Maple St. onramp ✓

Material Inspection/Release: Certificates of compliance obtained on 4-29-01.

PAY THIS ESTIMATE: 152.4 ✓

PREVIOUSLY PAID: 140.2 ✓

TOTAL TO DATE: 292.6 ✓

POSTED BY	DATE	POSTED TO
Office Engineer	05/19/01	CEM-6005, page 4, line 5

CEM4801

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONTRACT TRANSACTIONS INPUT

CEM-6004 (Rev. 10/1983) CT#7541-3515-0

DIST: 10 | CONTRACT NO.: 123454 | PASSWORD: I5#2

CASØA

PAGE NO. 04

LINE NO.	DATE MO.	DATE DAY	SOURCE DOCUMENT DESCRIPTION	BRIDGE	CONTRACT ITEM ENTRIES: ITEM NO.	+ -	QUANTITY (UNITS)	CODE	ALL OTHER ENTRIES: CCO NO.	+ -	AMOUNT($)	TYPE	ENT BY	✓ BY
01	05	19	48-14-17	b	014		, 1,273000				,		IME	URW
02	05	19	MAIL BOXES ON ELM ST		028		, , 15000	Q			,		IME	URW
03	05	19	ANT. ELIM. AC ON FLZ				, 1,500000	A			,		IME	URW
04	05	19	BAL. COMPL. ITEM 6		006		, ,	F			,		IME	URW
05	05	19	48-8-2		008		, ,1524000	F			,		IME	URW
06	05	19	RESTORE STATUS		039		REOPEN,	F			,		IME	URW
07	05	19	REV GRADE FR2 LINE				, ,				15,000000	ANT	IME	URW
08	05	19	51-4-2				, ,				2,174337	MHS	IME	URW
09	05	19	52-4-1				, ,				2,000000	SFM	IME	URW
10	05	19	53-4-1				, ,				315,000000	TAC	IME	URW
11	05	19	DELET DRAINAGE				, ,		029	-	100000	ACC	IME	URW
12	05	19	BAL. COMPL. CCO 18				, ,		018		,	BAL	IME	URW
13	05	19	RESTORE STATUS				, ,		005		REOPEN	BAL	IME	URW
14							, ,				,			
15							, ,				,			
16							, ,				,			
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24							, ,				,			

IN CASE OF QUESTION CONTACT: NAME I. M. Engineer

PHONE (123) 345-6789

93 95682

VERIFY

5-103C (3) Computer Processing

The contract item totals listed below are kept for contract work and also for structure work so that the totals can be reported separately when appropriate. Records of the financial status of the contract items are maintained as follows:

- Bid quantity: This quantity cannot be changed.
- Approved quantity: This item is the total of the bid quantity and the algebraic sum of the quantity changes due to contract change orders that have been filed.
- Authorized quantity: This item is the total of the approved quantity and the algebraic sum of the quantity balances that the engineer entered.
- Anticipated final quantity: This item is the total of the authorized quantity and the algebraic sum of the anticipated quantity changes that the engineer entered.
- Item status flag: This flag is a file mark that indicates whether a contract item is "Active," "Deleted," or "Completed."

5-103D Contract Change Orders

The CAS maintains separate records for each approved contract change order on a project. As each contract change order is approved, it must be entered into CAS through the use of Form CEM-4901, "Contract Change Order Input."

The method of entering each contract change order into the system may vary from district to district, but can be done as follows:

- The resident engineer writes a contract change order and completes Form CEM-4901. For approval procedures, see Section 5-3, "Contract Change Orders," of this manual. The approval date must be entered on Form CEM-4901, and the Form CEM-4901 data is then entered into CAS.
- The result of entering the form data for each contract change order will consist of a contract change order report and a disposition report.
- The resident engineer should review the contract change order report and correct any errors. CAS automatically makes the following changes to the contract records:
    1. The authorized final cost, the estimated final cost, the authorized contingency balance, and the estimated final contingency balance are adjusted to new values.
    2. The totals for changes in extra work, adjustment of compensation, and contract items are adjusted to new values.
    3. Each affected contract item will have the approved quantity adjusted to reflect the change.
- Immediately after Form CEM-4901 has been processed, CAS will accept extra work bills and anticipated changes that refer to the contract change order.
- When CAS processes a supplemental contract change order, the daily extra work reports in the holding file (due to insufficient funds in the original contract change order) will be made available for payment.

5-103D (1) Completing Form CEM-4901, "Contract Change Order Input"

Use Form CEM-4901 to perform the following functions:

- File a new contract change order in the computer file.
- Update (change existing information) a contract change order in the computer file.
- Replace a filed contract change order with another contract change order.
- Delete a contract change order from the computer file.

Completing the form depends on which of the above functions you desire.

5-103D (1a) File

Enter the contract and contract change order numbers at the top of the form. The original contract change order is supplement "zero"; enter the zero on the form. Ignore the function and override boxes at the top of the form.

The remainder of the form is divided into five sections labeled "Card Type 1," "Card Type 2," "Card Type 3," "Card Type 4," and "Card Type 5." Complete only those sections that are applicable.

Card Type 1: This section is required. Complete each entry in the section. If the entry for the field "Net Money Change This CCO" is zero, enter $0.00. The field "Time Extension Days" should include the number of working days added (or deleted), zero (0), or be coded "DEF" (instead of a number) if the contract change order was written with a deferred time adjustment clause. Enter a category code on every contract change order. Left-justify this code.

Card Type 2: If extra work or adjustment of compensation is not part of your contract change order, leave these fields blank. Otherwise, define the payment method by making three entries for each change:

- Make the first entry by checking either the "EW" or "AC" box to indicate extra work or adjustment of compensation.
- Make the second entry by choosing one of the "FA," "LS," or "UP" boxes to indicate whether payments will be made by force account, lump sum, or unit price.
- Make the third entry by entering the dollar amount of the change (increase or decrease).

If multiple items of work in the change order are using the same pay method, they must be totaled. Also, you can enter each pay method only once per change order. If there is more than one type of extra work or adjustment of compensation on the contract change order, continue making successive line entries.

Card Type 3: If you have no changes for contract item prices, do not complete this section of the form. Otherwise, furnish the item number and increase or decrease the quantity for each changed item.

Card Type 4: If all or part of the work to be done under the contract change order is structure work, enter the net dollar amount involved. This amount will contribute to the contract change order changes line of the structure totals shown on the next estimate.

If this section of the form does not apply or the amount is zero, leave the section blank.

Card Type 5: This section is required.

For federal participation, enter the FHWA funding participation determination on every contract change order. If participation is in part, indicate the breakdown for participation-in-part funding.

For federal segregation, if more than one funding source exists, show the percentage allotted to each federal funding source.

5-103D (1b) Update

Use this function in the following way to replace any incorrect information in Card Type 1 or Card Type 4:

- Enter the contract and contract change order numbers.
- Place the letter "U," in the function box at the top right of the form.
- Enter the correct information in the appropriate fields. All information in Card Type 1 is always required.
- Leave all other fields on the form blank.
- The module for processing contract change orders will identify the fields that you have completed and will change this information in the computer file.

5-103D (1c) Replace

If a contract change order has been stored with incorrect information that cannot be corrected by the update function, use the replace function in the following way:

- Complete the entire form exactly as you would for the file function, using correct information.
- Place "R," in the function box at the top right of the form.

The module for processing contract change orders will replace the data stored in the computer file with the new contract change order.

If payments have already been recorded against a payment method that you are trying to eliminate, it is not possible to immediately replace an old contract change order with a new one. The same holds true if the payment to date exceeds the authorized amount. In these cases, the system requires that you do the following:

- Enter corrections for the extra work bills that reverse payments to date to zero for the particular method of payment to be eliminated. For payments exceeding the authorized amount, enter corrections for the extra work bills to reduce payments below the authorized amount.
- Submit the replace request.
- After the contract change order has been replaced, reenter the extra work bills that were reversed.

When possible, use the update function instead of the replace function.

5-103D (1d) Delete
You can eliminate a contract change order from the computer file as follows:

- Enter the contract and contract change order numbers.
- Place the letter "D," in the function box at the top right of the form.

As with the replace function, a contract change order cannot be deleted until all payments have been reduced to zero through correcting entries on the daily extra work reports.

5-103D (2) Edits

The following lists some of the edits that a contract change order must pass through before the system will accept it:

- The contract change order number and the change order supplement number must be filled in or the change order will be rejected.
- The contract change order description cannot be blank, or the contract change order will be rejected.
- The net change amount cannot exceed the construction allotment. If the net change amount does exceed the construction allotment, the system will issue a warning message but will still file the contract change order.
- The approval date must be after the bid opening date and less than or equal to "today's" date; otherwise, the contract change order will be rejected.
- If the time extension days exceed 10 percent of the working days in the contract, the system issues a warning message but will still file the contract change order.
- If any payment method appears more than once on the input cards, the contract change order will be rejected.
- If you enter any contract item change for a void item, the system will reject the contract change order.
- Lump sum items may appear on contract change orders only as a deletion of that item. Any increase or decrease in a lump sum item will be rejected.
- You can enter a contract item on a contract change order as an increase and also as a decrease. If the item appears a third time, the system will reject the contract change order.
- If the contract item "mobilization" appears on a contract change order, the contract change order will be rejected.
- If the quantity change entry for a contract item exceeds the bid quantity, a warning message will be issued.
- The net dollar amount for the structure work on the contract change order must be greater than the sum of the negative changes and less than the sum of the positive changes, or the contract change order will be rejected.
- The net dollar change for the contract change order must equal the sum of the dollar amount in Card Type 2 and the extended dollar amounts for the quantities in Card Type 3, or the contract change order will be rejected.

- If the contract change order is already on file, the system will reject this duplicate entry. Additionally, if this contract change order's number exceeds by five the largest contract change order number on file, or if the supplement's number is more than two above the latest supplement on file for this contract change order, the system will reject the contract change order. However, if you checked the override field on the input field, the system will bypass such responses.
- If the contract is completed, a warning is issued.

If you request the replace or delete function, more extensive processing is done. The system checks to see if it can maintain the payment to date under a payment method. If the system cannot maintain the payment to date in this way, it rejects the request to replace or delete. A rejection notice is generated along with an explanation of what must be done to resolve this unacceptable situation.

The following is an example of this type of problem:

- A contract change order is entered for extra work at force account and accepted by the system.
- Subsequently, extra work bill payments are recorded against the contract change order.
- A request is entered to delete the contract change order from the computer file. In this case, the system will reject the delete request because the payment method would be eliminated. There are no other supplements to this contract change order. The system requires that entries to correct extra work bills be to reverse payments to date to zero. In such a case, the system would accept a delete request. In the more complicated cases where supplements to a contract change order exist, the system makes similar demands.

At this point, the processing of the contract change order is complete. However, when a supplemental contract change order is processed, the daily extra work reports in the holding file (due to insufficient funds in the original contract change order) will be made available for payment. The system produces a report, called a "DEWR Release From the Holding File." This report shows the action the system took.

5-103E Extra Work Billing

This module's purpose is to compute the amount of payment for extra work performed under a contract change order. This includes the following:

- Editing input information
- Retrieving and updating the contract change order
- Performing logic edits
- Conducting audit checks
- Performing computations
- Filing the extra work bill for payment
- Producing an edit report and daily extra work report

In addition to these functions, this module allows for entering corrections to filed extra work bills. Extra work bills or corrections to filed extra work bills will not be rejected because of insufficient funds (subject to the limitations in Section 3-904, "Payment for Extra Work," of this manual). Instead, the system will place the extra work bills or the corrections to filed extra work bills in a holding file to await the

resident engineer's further action. Usually, the resident engineer must write a supplemental contract change order to provide additional funds; the supplemental contract change order will make the appropriate extra work bills available for payment.

Use Form CEM-4902, "Extra Work Bill (Short Form)," to enter basic information related to extra work performed under a contract change order. The following describes the procedures for obtaining the information from the contractor, entering the information into the computer, and producing the daily extra work reports.

5-103E (1) Preparing Form CEM-4902, Extra Work Bill (Short Form)

The contractor may enter extra work bills on the Form CEM-4902, "Extra Work Bill (Short Form)." Or, if more entries are required for equipment, labor, or material, the contractor must use the four part forms CEM-4902A, CEM-4902B, CEM-4092C, and CEM-4902D.

The contractor initiates forms containing force account payment and submits them to the resident engineer. The resident engineer initiates forms containing payment at agreed prices. The backs of the forms contain the basic instructions for completing the forms. The following information supplements the instructions on the forms:

5-103E (1a) Basic Information (Title Page)
Do the following for the basic information:

- The contract change order number: Right-hand justify this number; for instance, contract change order 1 is 001, contract change order 10 is 010.
- Report number: The contractor should leave the report number blank. Duplicate numbers will be rejected (except for corrections to previous bills).
- Date performed: A separate extra work bill must exist for each day on which force account work is performed (except for work done by a specialist). Enter the date the work was performed in these spaces. For extra work bills covering invoices only, enter the date on which the material was used. If this entry is not practical, enter the current date. You must enter a date in this field. You may enter the acronym "VAR" in the date performed field if the pay method is lump-sum unit-price or if equipment and labor are not present on the bill.
- Date of report: Enter the date on which the report is prepared.
- Payment method: Ensure the method selected matches one of the methods authorized by the contract change order.
- Bridge: Place the letter "T" in this box if toll bridge work is involved and you want to apply a 10 percent markup to equipment and material and a 25 percent markup to labor.
- Fifty percent flagging: You must include on the extra work bill the total hours spent on flagging because the computer will make payment of only 50 percent of the total. For flagging that is not subject to the 50 percent split, submit separate extra work bills.

- Labor surcharge: The contractor should enter this surcharge as a whole number; for instance, “15 percent” is entered as “15.” The contractor should obtain the applicable percent from the effective *Labor Surcharge & Equipment Rental Rates (Cost of Equipment Ownership)* book. This surcharge is for regular hours. The system will apply the overtime surcharge based on the regular hour surcharge.

- Work performed by: This field should contain the name of the organization (the contractor, subcontractor or other) that performed the work. If the extra work bill is for an invoice only, enter the name of the organization to which the invoice was addressed. Submit a separate daily extra work bill for each organization’s work.

5-103E (1b) Equipment
Do the following for equipment:

- Equipment identification number: Enter this number (Required.) It can be any number that the contractor assigned to the equipment for specific identification.

- Equipment description: Enter the description, which consists of four items: the “Class,” “Make,” “Code,” and “Attach” (attachments). The equipment description must come from the applicable *Labor Surcharge & Equipment Rental Rates (Cost of Equipment Ownership)* book. Make a copy of this publication available to the contractor. You can obtain from the Division of Construction’s web site a listing of miscellaneous equipment, for equipment not shown in the *Labor Surcharge & Equipment Rental Rates (Cost of Equipment Ownership)* book.

- For equipment that is neither in *Labor Surcharge & Equipment Rental Rates (Cost of Equipment Ownership)* book nor available from the web site’s miscellaneous listing, the contractor must request a rate from the resident engineer. The resident engineer will obtain an approved rate from the Division of Construction’s rental rate engineer.

- Equipment for which a contract change order has established the rental rate will not have an equipment description and must be included as a unit price payment on the material charges portion of Form CEM-4902, lines 24–33 of the daily extra work report.

- The following explains the procedures for “Class,” “Make,” “Code,” and “Attach,” within equipment description:

  1. Class: This portion of the equipment description will be found in the *Labor Surcharge & Equipment Rental Rates (Cost of Equipment Ownership)* book under the heading for a particular class. For instance, after “Hydraulic Cranes and Excavators, Crawler Mounted” you will find the class “HCECL.”

  2. Make: For the equipment illustrated under “Class” above, you will find the “Make” portion of the equipment description in the left-hand column. For instance, after “Bantam” you will find the make “BANT.”

  3. Code: For the equipment illustrated under “Class” and “Make” above, you will find the “Code” portion of the equipment description in the “Code” column. For instance, after “Model C-266” you will find the code “0680.”

4. Attach: You will find this portion of the equipment description in the front of the *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book. The rate for the equipment under ”Class,” “Make,” and “Code” above includes all attachments and accessories. Therefore, leave this column blank.

Enter all equipment descriptions beginning at the left of each field. Include all letters, numbers, dashes, or other symbols as they are shown in the *Labor Surcharge & Equipment Rental Rates (Cost of Equipment Ownership)* book.

- Regular hours for which payment is to be made: Enter the regular hours for which payment is to be made. Regular hours may not exceed 8 unless you are entering a daily rate item. If the date the work was performed is various, you may enter up to 99 in the regular hours field. Various is used for equipment at day rates.
- Overtime hours: Enter the overtime hours worked. Overtime hours may not exceed 16.

5-103E (1c) Other Expenses Subject to Labor Markup

This portion of the form is for travel expenses that cannot be entered as “Subsistence” under “Labor.”

If the units and rate are already entered, the computer will calculate the amount. Otherwise, enter the amount, and this figure will be used.

Note: If you use the “Unit” and “Rate” fields, leave the “Amount” field blank. If you enter an amount in the “Amount” field, don’t make an entry in the “Unit” and “Rate” fields.

5-103E (1d) Material or Work Done by Specialists, Lump Sum, or Unit Price Payments

The following explains the procedures for completing the Form CEM-4902 material section:

- Material: Note that the material entry will not be processed unless there is a value in both the “Units” and the “Unit Cost or Net Pay” fields. Do the following for material:
  1. Invoice date: Preferably, enter the date of the invoice to help in checking for duplicate billing. However, if entering the invoice date is not practical, enter the date the material was used.
  2. Invoice description: Enter a brief description of material.
  3. Units: Normally, enter the unit one (1.00) for materials used.
  4. Unit cost or net pay: In this column, enter the amount for which payment is due. Normally, this amount is the cost of the material plus tax, if applicable, less any discount offered.
- Work Done by Specialists: Enter this item in the same manner as described under “Material” above.

- Lump Sum: Follow the procedures below for this entry:

  1. Vendor name and invoice number: You do not need to make any entries in the vendor column or the invoice number column.

  2. Date: Enter the date the work was performed. When entering this date is not practical, enter the current date.

  3. Invoice description: Enter "per CCO No._____."

  4. Units: Enter the units to be paid as a percentage of the lump sum amount, expressed in decimals. For instance, express 75 percent as 0.75. This figure must never exceed a total of 1.000.

  5. Unit cost or net pay: Enter the lump sum amount from the contract change order.

- Unit price payments: Enter this item in the same manner as described under "Lump Sum" above.

- Units: enter the number of units to be paid.

- Unit cost or net pay: enter the unit cost from the contract change order.

5-103E (1e) Signature of Prime Contractor's Representative

For all force account payments, the contractor or contractor's authorized representative must sign the extra work bill. For agreed price payments, the signature is not required.

5-103E (2) Processing Form CEM-4902

The resident engineer receives Form CEM-4902, "Extra Work Bill (Short Form)," from the contractor, reviews the form, and if it is satisfactory, signs the extra work bill and approves it for entry into CAS. When reviewing the submitted extra work bill, the resident engineer must be guided by the policy contained in Section 3-9, "Measurement and Payment," of this manual. The following explains how the system will process Form CEM-4902:

- You must request CAS to print a copy of the extra work bill after it has been entered into the system before it will be paid.
- Computer programs will perform the following processes:
  1. Edit all information for acceptability. For example, numeric data must be in numeric form, or the program will issue a warning.
  2. Select information from the equipment database, for example, rates, descriptions, and attachments.
  3. Validate the contract number, contract change order number, report number, type of work (payment method), dates, corrections, labor surcharge, and equipment description.
  4. Audit right-of-way delay and the hours equipment and labor are used for work.
  5. Compute extensions, markups and summaries.
  6. Ensure the authorized amount (for instance 100 percent or $15,000) is not exceeded.
  7. File a validated extra work bill for payment at the estimate time.
  8. Produce a daily extra work report. This report will contain all the information as entered on the extra work bill plus equipment descriptions, extensions, markups, total payment, and contract information.
  9. Produce an edit report. This report will contain processing results. These results are tabulated by contract change order within a contract. If the system rejects an entry, the rejection messages will be included on the daily extra work report. If the system accepts the extra work bill, all warning messages will be contained on the edit report.
- After the reports have been printed and the district construction office has received them, the district will forward copies to the resident engineer. Daily extra work reports are printed in two parts, one for the contractor, one for the resident engineer.

5-103E (3) Corrections to Extra Work Bills

You can make corrections to the extra work bill after it has been entered into the system, but there is a limit of four corrections per extra work bill. See *Entry of Extra Work Bills Manual (CASEWBM)*

5-103F Generating Estimates

CAS produces the following five types of estimates on demand:

- Monthly progress estimate
- Progress estimate after acceptance

- Supplemental progress estimate
- Semifinal estimate
- Final estimate

The resident engineer will regularly request the monthly progress and the progress after acceptance estimates while the remaining three types of estimates usually will be requested in cooperation with, or by, the district construction office.

Supplemental progress estimates may only be run between the completion of the monthly progress estimate run and the 15th of the following month.

Producing an estimate is completely automatic, based on data previously stored in the computer.

In addition, CAS will produce two other types of estimates that do not generate payments. These estimates are simply statements of the current status of the computer files. The following are the two types:

- Status purpose only estimate
- Proposed final estimate

5-103F (1) Procedure

Before requesting the first monthly progress estimate, enter the date work started and the responsible unit on Form CEM-6003, "Progress Pay-Estimate Project Initiation or Update." The Division of Construction progress pay coordinator enters the approval date. If the approval date is not in the computer file, the system will reject the estimate request.

The procedure for processing an estimate involves the following steps:

- Preparing Form CEM-6001, "Project Record-Estimate Request," and verifying the estimate. Transmit these to the district office.
- Computer processing your estimate and printing the reports.
- The district construction office verifies the estimate results.
- Returning the estimate reports to the resident engineer.

The schedule for completing the pay process and making payment to the contractor is rigid. This rigid schedule means all people involved must adhere to their individual schedules. District construction offices will advise resident engineers of the schedules.

5-103F (1a) Preparing Form CEM-6001, "Project Record-Estimate Request"
To request an estimate, prepare Form CEM-6001, "Project Record-Estimate Request." Complete this form accurately in accordance with the following:

5-103F (1b) Estimate Parameters:
For the estimate parameters follow the instructions below.

- Enter the contract number.
- Enter the estimate number. This number must be one greater than the last estimate that was successfully processed and paid.

- Enter the work period's ending date in the estimate for the form's "Work Performed Through" field. For a progress estimate or a supplemental progress estimate, enter the 20th day of the month. For all other types of estimates, use the date of completion.
- If this is a monthly progress estimate, place an "X" in the matching box on the form; otherwise, leave the box blank.
- If this is a progress estimate after acceptance, place an "X" in the matching box on the form; otherwise, leave the box blank.
- Enter the estimated date of completion. This date should be the resident engineer's best estimate, not necessarily the computed date. If this estimate is not a progress estimate, enter the date of completion.
- Enter the values as of the "date work performed through" for chargeable working days, weather nonworking days, approved time extension days (contract change order), and approved time extension days (other) in the four matching fields of the form. The system will check the chargeable working days and weather nonworking days against the working days calendar and inform you of possible entry errors. However, it cannot check the two types of time extension days. These values affect the system's computation of percent time elapsed.
- If you have a landscape contract that is in the plant establishment period, check one of the two boxes to indicate whether progress is satisfactory or unsatisfactory. These boxes are not for highway contracts that contain "Type 2" plant establishment periods. If you are unsure of this status, contact the district construction office after reading the special provisions.
- The system determines whether contract progress is satisfactory or unsatisfactory. Occasionally, a situation arises where, even though progress is mathematically unsatisfactory, the resident engineer wishes to override the system and record satisfactory progress. To accomplish this override, place an "X" in the field, "Override Unsatisfactory Progress." Also see the second bullet below this one about projects with dual time limits.
- For some contracts, the standard manual formula does not apply for computing percent time elapsed. For such contracts, interpret the special provisions, and determine this percentage. Enter the percent in the box on the form; this will override the system's calculation.
- If you have checked "Override Unsatisfactory Progress" (see the bullet two up from this one that discusses overriding the system) or entered a number in percent time elapsed (see the previous bullet), enter a short explanation in the 25 spaces immediately below these fields on the form. Typical entries might be "CCO days pending" or "Nonstandard time format."
- If the estimate is a supplemental progress estimate, proposed final estimate, semifinal estimate, or final estimate, check the appropriate box. Note that on a supplemental progress estimate the date for "Estimate for Work Performed Through" and all of the working day information should be the same as the date for the last estimate.

- If this estimate is a rerun (a recalculation) of a prior successful estimate, check the recalculation box. Note that, if the last estimate processed was a status purpose only estimate, you are not rerunning an estimate this month; instead, you are trying to run the estimate that did not generate payment. Normally, the district office will enter requests to rerun an estimate.

5-103F (1c) Deductions:

If you wish to take one or more deductions or to return one or more deductions from a prior estimate, enter them on Form CEM-6001. If you wish to rerun an estimate or to pay an estimate after a status only estimate, you still must enter the deductions again because any deduction stored in the computer file and carrying this estimate number will be erased automatically. You can enter five types of deductions on this form. Each deduction entered requires an alpha code to be placed in the form's type field and an entry in the description field. Use a minus sign to take a deduction and a plus sign to return a previous deduction. The following lists the rules by type of description:

- Administrative deductions: Enter "ADM" in the type field. Both plus and minus deductions are allowed.
- Equal employment opportunity deductions: Enter "EEO" in the type field. Both plus and minus deductions are allowed, but plus deductions should be adjustments or reversals of deductions taken on prior estimates. If you wish to take an EEO deduction on this estimate, leave the amount field blank. The system will compute the deduction amount for you. Only one "blank" EEO deduction, normally entered by the labor compliance officer, can appear on the form. Note: The system will not accept EEO deductions if the contract item payment for this estimate is zero. It may be necessary to enter the minimum amount of $1000.
- Labor compliance violation deductions: The labor compliance officer usually makes these entries on the form. The officer will enter "LCV" in the type field. The rules for LCV deductions are identical to those for EEO deductions. Note: "LCV" deductions will not be taken if the contract item payment for this estimate is zero. It may be necessary to enter the minimum amount of $1000.
- Liquidated damages deductions: Enter "LIQ" in the type field. Both plus and minus deductions are allowed. Plus deductions reverse earlier deductions.
- Other outstanding documents deductions: Enter "OOD" in the type field. If you wish to take this deduction, leave the amount field blank. The system will compute the amount for you. Take this deduction only once per contract. The system will maintain the correct deduction on subsequent estimates by generating "OOD" in the type field with a description, "MAINTAIN OOD DEDUCT." You can reverse the deduction at any time by entering a plus amount that exactly reverses the OOD deductions to date from the previous estimate. Negative OOD deduction amounts are never allowed on the input form.

After carefully preparing Form CEM-6001, promptly send it to the district office. The specific deadline for submittal may vary by district.

5-103F (2) Computer Processing

Once you have made your entries on Form CEM-6001 and transferred them to the computer, the system edits the estimates and then produces reports showing the results of the system's processing.

5-103F (2a) Estimate Edits

Once Form CEM-6001 has been entered into CAS, CAS will do the following:

- Edit Form CEM-6001 for consistency with previous estimates and with the working days calendar stored in the computer.
- Identify and summarize all daily extra work reports entered in the system and eligible for payment since the last estimate.
- Identify and summarize all contract transactions entered in the system since the last estimate.
- Identify and balance the contract change orders that require balancing.
- Identify and balance the contract items that require balancing.
- Make calculations for the item "Mobilization" (if necessary), for the various deductions and retentions, for percent time elapsed, for percent complete, and for various status totals, such as authorized final cost. The system also determines whether the contractor's progress is satisfactory.
- Edit any deduction submitted for processing on Form CEM-6001. Special attention is given to three of the deductions as follows:
    1. If the resident engineer has submitted an EEO deduction, CAS computes the amount as 10 percent of the contract item payment on this estimate, or a minimum of $1,000 or a maximum of $10,000, and places the deduction on file.
    2. If the resident engineer has submitted an LCV deduction, the system performs the same calculation as for EEO deductions described above.
    3. If the resident engineer has submitted an OOD deduction, the system will compute the deduction under the following conditions:
        a. The contract has been completed, or retention is being reduced because the percent complete exceeds 95 percent. If one of these conditions is not met, the deduction will be rejected.
        b. The total of all OOD deductions from prior estimates must be zero, or the deduction will be rejected. An OOD deduction should be taken only once for a contract.
        c. If the first two conditions are met, the amount of the deduction is calculated as 5 percent of the total work completed to date less mobilization, or $10,000, whichever is less.
- Further deduction processing as follows:
    1. If the total to date for an OOD deduction is negative, the system will check whether the value for has changed since the last estimate for total work completed to date less mobilization. If the value has changed, the system will generate a new OOD deduction with a description,

"MAINTAIN OOD DEDUCT," and an amount equal to the difference between the amount demanded by the formula and the amount of the total to date for this type of deduction. Thus, an OOD deduction, once submitted, will be maintained at the formula's value unless it is exactly reversed by a positive deduction entry on Form CEM-6001.

2. For each type of deduction, you cannot give back more than has been taken. If you make this error, the estimate will fail. Messages are produced stating which deduction is in error.

3. At this point in the processing, the final values are computed for total work completed and total payment to the contractor. If there are "Limitation of Payment" dates and amounts in the special provisions for this contract, the Division of Construction progress pay coordinator will have entered them in the computer. The system will check the period ending date of this estimate and will generate or return any split-year-financing deductions that are necessary under the contract's terms.

4. If retention is being released on this estimate and the total to date for liquidated damages is zero, the system will issue a warning message.

5. The system automatically computes overbid item deductions as required. These deductions are taken and returned at the appropriate times.

- Makes calculations for the progress payment voucher, including retentions and payments to escrow accounts.
- Determining the success of the estimate's processing.
- If processing is successful, CAS prints your estimate.
- If this estimate is for a zero or negative progress payment, the system prints a status purpose only estimate.

  1. If the total authorized final cost is greater than the construction allotment, CAS will issue a severe warning.

  2. If the total payment to date to the contractor on this estimate is greater than the construction allotment, the estimate will fail.

5-103F (2b) Estimate Output

Once CAS has processed the estimates, it produces the following reports:

- Schedule of extra work
- Schedule of deductions
- Project record estimate
- Project status
- Work done by office of structures
- Progress payment voucher

Only two copies of the estimate will be sent to the field, one for the resident engineer and one for the contractor. The contractor also must receive the first three reports listed above and the last report listed above.

In addition to the estimate documents listed above, CAS also produces a report called "Estimate Processing Results." This report is the tool by which the resident engineer can check the "estimate package." This report has the following sections:

- Edit messages: The system can produce many possible messages. If your estimate is rejected, the exact reason will be found here. To assist in preventing overpayments, among other problems, warning messages have been set based on carefully chosen tolerances. You must read these messages carefully.
- Transaction selection: The system will print a list of the exact pages and lines of contract transactions that were used to produce the estimate. This list enables you to verify that all the contract transactions you submitted were used to produce the estimate.
- Contract change order processing: This lists any balancing of contract change orders by the system. Occasionally, the list contains warning messages, too.
- Contract item processing: This part of the report does the same things as described in the bullet above, but for contract items instead of contract change orders.
- Contract transactions list: This list identifies all contract transactions used to generate your estimate. If you question any line item on the project record-estimate, examine the detailed records to see how the system derived its totals.
- Structure totals: This item summarizes all structure work the system found while processing the estimate.

5-103F (3) Potential Problems

For the unwary, several points in the estimate process can cause errors. These problems result from misunderstanding what constitutes an estimate and how the estimate number should be increased from estimate to estimate.

On the title page of the project record-estimate and in the estimate processing results, the system will print the type of estimate generated. If the estimate is one of the five types listed previously under the heading "Generating Estimates," a valid estimate was generated.

The progress pay system requires that the estimate number be increased only by valid estimates. Thus, if you request estimate number 3 to be processed, but the system generates a status purpose only estimate, a valid estimate was not generated. Request estimate number 3 again for the next estimate.

Another potential problem involves two types of contract transaction: materials on hand and anticipated changes. These transactions apply to a specific estimate period. If the estimate generated by the system is a status purpose only estimate, these transactions have not been "used." They will appear on the next valid estimate generated. If their appearance on the next estimate is not satisfactory, you must use reversing entries before requesting the next estimate from the system.

If the estimate has failed for any reason, the system will print, with one exception, as many of the estimate reports as possible to help you analyze the problem. The one exception, the progress payment voucher, is only printed for successful estimates that are eligible for payment according to the system's standards.

Processing the estimate is done by a series of computer programs that perform the following functions:

- Input edit of the CEM-6001, "Project-Record Estimate Request."
- Select from the computer file the extra work bills that will be used to generate this estimate.
- Select from the computer file the contract transactions that will be used to generate this estimate.
- Process the contract change orders.
- Process contract items.
- Process deductions.
- Conduct miscellaneous computations.
- Generate reports.

5-103G Approval of Estimates

The authority to approve an estimate depends on the type of estimate being run. The following is the general outline and method for approving contract estimates.

5-103G (1) The Resident Engineer

After an estimate has been run, the resident engineer must approve it before the process of payment is continued. To expedite payment, the resident engineer can approve through a memo, form letter, or telephone call with subsequent written confirmation to the district office.

5-103G (2) The District Director

At the time the estimate was produced, so was Form FA 729A, "Progress Payment Voucher,". If the estimate is a final estimate, an individual who has been formally delegated by the district director to do so must sign the form.

5-103G (3) Flagging an Estimate for Payment

Flagging an estimate in the computer system for payment indicates that Form FA 729A has been verified and approved.

For payments on after acceptance estimates, semifinal estimates, and final estimates, the Division of Construction progress pay coordinator must flag the estimates in the computer system for payment after the district's flagging.

5-103H Reports Available Through CAS

CAS provides many reports that must be requested specifically. Normally, resident engineers must request reports through the district construction office. Use Form CEM-6002, "Contract Administration System (CAS)-Report Requests," to obtain the reports. The following are the instructions for completing Form CEM-6002. A sample of Form CEM-6002 is included in the appendix.

5-103H (1) District (XX) Estimate Status

This report, which is also available statewide, provides information on the pay status of each contract in the district. For each contract, the report includes the following:

- Contract number
- Date of last estimate processed (if there was one)

- Number of the estimate
- Number of days elapsed since the estimate was processed
- Type of estimate
- Pay status and date paid (if paid)
- Date on which the payment voucher was approved
- Resident engineer's name and phone number
- Responsible unit
- Password

5-103H (2) Project Management

The project management report is for use by the district office and Division of Construction managers. This report consists of the following two separate reports that are produced whenever "Project Management" is requested.

5-103H (2a) The Project File Status Report

This report lists all contracts in the district (or statewide) that are on the computer's active list. For each contract, the report provides the following information:

- Contract number
- Status
- Date bids were opened
- Date of award
- Date of approval
- Date of acceptance
- Bid amount
- Name of contractor

After bid opening, projects are added to the list automatically. After the final estimate and approvals from the districts and the disbursing office, the Division of Construction removes the projects from the list.

5-103H (2b) The Exceptional Contracts Report

This report lists all contracts for which the following applies:

- More than 60 days have elapsed since the bid opening.
- More than 10 days have elapsed since the completion date and the contract needs an acceptance date.
- More than 45 days have elapsed since completion, but the proposed final estimates have not been run.
- More than 180 days have elapsed since completion, but the final estimates have not been run.

5-103H (3) District (XX) Project Status

This report is for use by construction managers. It lists all active contracts, and for each contract, provides the following information:

- Contract number
- Contractor's name and county-route-kilopost
- Date of the last estimate
- Percent complete
- Percent of time elapsed
- Construction allotment
- Total amount paid to date
- Estimated final cost
- Estimated final contingency balance

5-103H (4) Progress Payment-Work Done by Office of Structure Construction (Copies)

This report is for use by the Office of Structure Construction. For details, see Volume I, Section 6, of the *Bridge Construction Records and Procedures Manual*.

5-103H (5) Project Record-Estimate (Copies)

A request for estimate copies will produce all of the documents that were produced automatically during the previous estimate's run. Normally, therefore, you should not need to order copies through this program. For the estimate, the report contains the following information:

- Schedule of extra work
- Schedule of deductions
- Project record-estimate
- Project status
- Progress payment voucher

5-103H (6) Status of Contract Items

Normally, the district office requests this report monthly for all ongoing contracts. The report must be filed in Category 60, "Progress Status Sheets."

For this report, the system prints one line of information for each contract item and summarizes the net effect of all contract transactions that have been entered against the item. This report allows the resident engineer to review each item and determine whether quantity balances and anticipated changes, among other things, are necessary.

If any particular number on the report seems questionable, the project record item sheets provide supporting detail. For example, if the approved quantity differs from the bid quantity, the project record item sheets describe, under the item number, any changes due to contract change orders.

When applicable, take particular care to flag an item "COMPLETE" (using the item final balance transaction on Form CEM-6001) so that an accurate project status will be produced. Remember, flagging an item "COMPLETE" does not mean that contract item transactions will no longer be accepted; it means only that you have commanded the system to keep the item in balance at all times.

5-103H (7) Project Record Item Sheet

Normally, the district office requests this report monthly for all ongoing contracts. The report must be filed in Category 60.

With the following exceptions, the project record item sheets list every contract transaction entered into the system since the beginning of the contract:

- Item and contract change order final balance transactions will appear only on the report following the next estimate. Thereafter, they are dropped from the report.
- Miscellaneous anticipated change transactions also appear only on the report following the next estimate.

The report lists the contract transactions first by the estimate number on which they were paid and then by the page and line number of the input form. The total to date will be printed.

Do not retain previous issues of this report in the project's files. However, one issue, usually the one requested immediately after all final quantities have been paid, must be retained in the project's files.

5-103H (8) Status of Contract Change Orders

Normally, the district office requests this report monthly for all ongoing contracts. The report must be filed in Category 60, "Progress Status Sheets."

This report is similar to the status of contract items, which allows the engineer to review each contract change order.

Use the report to determine when supplemental contract change orders will be necessary to complete the work. The report also facilitates a review of those contract change orders where a credit is due Caltrans.

When applicable, flag contract change orders "COMPLETE" (using the contract change order final balance transaction) so that an accurate project status can be produced. Similar to flagging a contract item, flagging a contract change order "COMPLETE" means only that you have commanded the system to keep the contract change order in balance at all times.

5-103H (9) CCO Master Listing

Normally, the district office requests this report monthly for all ongoing contracts. The report must be filed in Category 60.

This report summarizes all contract change orders stored in the computer file. It also contains the contract change order time extension and contract change order category code. The report lists each individual supplement with all the information the system contains. Do not retain previous issues in the project's files. However, one issue, usually the one requested immediately after final payment has been made on all contract change orders, must be retained in the project's files.

5-103H (10) Bridge Quantities by Structure

This report is for use by Office of Structure Construction personnel. It is available on all projects for which Form CEM-6003, "Progress Pay-Estimate Project Initiation or Update," has been filed. The filing of this form indicates a structure work amount and structure numbers have been entered for the contract transaction in accordance with the instructions in Volume 1, Section 6 of the *Bridge Construction Records and Procedures Manual*.

5-103H (11) District (XX) Status of Anticipated Changes

This report is for use by the district and Division of Construction managers.

5-103H (12) Project Record-Estimate (Dummy)

A request for this item will produce the same form that was produced automatically when Form CEM-6003, "Progress Pay-Estimate Project Initiation or Update" was filed.

This form is identical to a project record-estimate, except that it does not contain an estimate number or dates and no entries appear under "This Estimate" or "Total Estimate." It is a blank estimate form, valuable only if it became necessary to make an estimate manually.

5-103H (13) Contract Contents Report

This report contains information that is currently in the file as a result of automatic entries or entries from Form CEM-6003 "Progress Pay-Estimate Project Initiation or Update."

Most of the information in this report is included already in other reports and forms that are produced automatically. Therefore, you do not need to request it routinely.

5-103H (14) Contract Contents Report-Contract Item Records

This report provides the following information:

- Contract item number
- Contract item index number
- Item description
- Unit of measure
- Bid price
- Bid quantity
- Bid amount
- Amount overbid
- Void items
- Plant establishment items

Most of the information in this report is included already in other reports and forms that are produced automatically. Therefore, you do not need it for routine contract administration.

5-103H (15) Contract Contents Report-Contract Progress

For each contract item, this report includes a detailed analysis of the current and prior quantities and payment status. It also summarizes all other payments or deductions as well as data on contract time. The information in this report is included already in various other reports that are produced automatically. Therefore, you do not need it for routine contract administration.

5-103H (16) DEWRs in Holding File

This report lists extra work bills that are in the holding file for all contracts in the district. If there are reports in the holding file, process supplemental contract change orders to provide additional funds. The system will then automatically release the bills for the next estimate.

5-103H (17) Daily Extra Work Report

Copies of daily extra work reports are produced under the procedure outlined earlier in this section under "Extra Work Billing." You can obtain copies by using the second page of the report request form.

5-103H (18) Rental Rates and Codes for Miscellaneous Equipment

This report provides a listing of equipment codes and related descriptive information for equipment that is not included in the *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* book.

5-103H (19) Reports for the Office of Structure Construction

In addition to the reports discussed above, CAS provides reports for the Office of Structure Construction. For details, see Volume I, Section 6, of the *Bridge Construction Records and Procedures Manual*.

5-103I Field Audits by Accounting Office

In accordance with instructions from the Division of Administrative Services, personnel from the Accounting Office will periodically review record-keeping procedures for construction projects. The accounting reviewer will prepare a report of the findings, a copy of which will be sent to the deputy district director of construction and the resident engineer.

District construction must then report back to the Accounting Office, stating what actions it took in response to the report's recommendations. If the district's actions result in a dispute, the deputy district director of construction will resolve the dispute

5-104 Final Construction Project Records

5-104 Final Construction Project Records

5-104A General

Construction project records consist of all material in the construction files, whether in the field office, the district construction office, or the Division of Construction office. This section contains guidelines for the disposition of construction project records after Caltrans makes the final payment. This section also provides guidelines for allowing public access to construction project records and for producing a set of as-built plans for each completed construction project. In addition to construction project records, the district keeps a project history file. For information about this history project file, see Chapter 7, "Uniform File System," of the *Project Development Procedures Manual*.

5-104B Public Access to Project Records

The California Public Records Act permits anyone to obtain any written information relating to the conduct of the public's business that is prepared, owned, used, or retained by any state agency, regardless of the physical form or characteristic of the writing. Although the act includes exemptions for certain categories of records, most construction project records fall within the description of documents that must be produced upon proper demand. Except for preliminary drafts or notes that are not retained in the ordinary course of business, permanent project records that are reasonably identified are subject to inspection and copy.

Records exempt from disclosure include the following:

- Estimated project cost before bidding.
- Contract claim analysis.
- Personal information, such as home addresses, telephone numbers, medical records, and similar files, the disclosure of which would constitute an unwarranted invasion of personal privacy.
- Accident reports. If accident reports produced by another agency are requested, such as accident reports by the California Highway Patrol, refer the requester to the other agency.

If copies of payroll records are requested, see Section 7-1.01A(3), "Payroll Records," of the *Standard Specifications* for the procedures to follow.

Resident engineers should refer all requests for copies of any records to the district construction office and follow procedures established in the district for copying and charging for record copies.

Allow contractors and subcontractors to review records used to determine contract payment in the construction field office.

5-104C Disposition of Construction Project Records

District construction personnel who are responsible for the disposition of construction project records must coordinate their activities with the district records officer.

The district construction office must establish a procedure for handling construction project records. This procedure must meet Caltrans record keeping policy and achieve the following objectives:

- Relieve the resident engineer of the responsibility for storing the records before or at the time final payment is made.
- Avoid unnecessary long-term storage of duplicate copies.
- Before the records are destroyed, transfer material that has historical value to the project history file.
- Retain construction project records as follows:
    1. For projects that involve federal participation, retain the records for a minimum of three years after submission of the final voucher.
    2. For projects that do not involve federal participation, retain the records for a minimum of three years after the date on which the final estimate is scheduled for payment.

3. For projects on which some legal question exists, such as a pending claim, a labor compliance case, or litigation, retain the records for three years after settlement. The district construction office must send a memorandum to the district records officer to hold these records until further notice.

When the district no longer needs the records in categories 1, 2, 3, 4, 7, and 28, destroy them. Do not retain them as part of the project construction records.

After records from the resident engineer's office are sent to the district construction office, eliminate duplicate records.

Copies of Form CEM-6301, "Contract Acceptance," and the final Form CEM-2701, "Weekly Statement of Working Days," are sent to the progress pay coordinator in the Division of Construction.

When records are sent from the district construction office to the State Record Center or to another district, prepare a transmittal list specifying the contents of each box. In a separate file in the district construction office, retain a copy of the transmittal list.

The Division of Construction also retains project records to ensure that adequate records are available to defend Caltrans in civil suits, especially those related to contractor's claims. After projects have been completed, the Division of Construction transfers files listed in the current "records retention schedule" for the Division of Construction to the State Records Center.

The *Bridge Construction Records and Procedures Manual* should be referenced for bridge and structure's related records that are transmitted to the Office of Structure Construction at the completion of the project for permanent storage.

5-104D As-Built Plans

Districts are responsible for all as-built road plans, and the Office of Structure Design is responsible for all as-built structure plans. To handle as-built plans, use the following procedure:

The district design unit will give the resident engineer full-size prints of all road plans. Prints of structure plans will be supplied to the structure representative. The plans may also be transmitted in electronic form when field forces have the capability of computer-aided drafting and design (CADD). As-built information is recorded on the full-size drawings or recorded on a set of contract plans using CADD.

Each sheet of as-built plans must be clearly identified as such. All sheets upon which changes are made must contain the name of the resident engineer or structure representative.

5-104D (1) District Procedure on As-Built Plans

The district will maintain a set of original project plan sheets. Field changes will be made on full-size prints or in a field CADD system and afterwards transferred to the original CADD files in the district office. The set of plans, with changes delineated by the district design unit, becomes the as-built plans.

To attain uniformity in final project plans, include the following data on the as-built plans:

- Contract change order number.
- Revisions in alignment and right of way.
- Grade revisions in excess of 30 mm.

- Changes in length, size, flow line elevations, and station of culverts. When alternate types of culverts are permitted, show which alternate was used.
- Drainage changes.
- Location of sewers, conduits, and other features.
- Location of monuments, bench marks, freeway fences, and gates.
- Revision of typical cross sections.
- Changes in pavement lanes, tapers, ramps, frontage roads, road connections, driveways, sidewalks, islands, and median openings.
- Curb and gutter changes.
- Electrical conduits, pull boxes, and service points.
- Revision in location of utility crossings and irrigation crossovers.

Do not show the following on as-built plants:

- Construction quantities.
- Property fences.
- Miscellaneous small features, such as markers and delineators, which are readily changed by maintenance forces.

The resident engineer must complete the as-built plans as soon as possible after work is completed, but no later than 60 days after contract acceptance.

After the district design unit has completed the transfer of as-built information on the final as-built drawings, the unit will return the plans to the resident engineer for review and signature of final approval. For the processing and disposition of as-built plans after the construction review, see Chapter 15, "Final Project Development Procedures," of the *Project Development Procedures Manual*.

5-104D (2) Procedure on As-Built Plans for Bridges and Structures

The Office of Structure Construction must handle structure as-built plans in the following manner:

- From the resident engineer, obtain full-size prints of all sheets with "Structure" signature blocks. If these prints are not available from the resident engineer, the structure representative must contact the Office of Structure Design.
- The structure representative will make the as-built corrections to these prints and forward them to the Sacramento office of the Office of Structure Construction. These corrected prints must be forwarded to the Sacramento office as soon as possible after completion of the structures, but no later than 30 days after the completion of the project.
- For prints of projects consisting solely of roadside rests or maintenance facilities, the Sacramento office of the Office of Structure Construction must forward the prints directly to the Office of Structure Design, documents unit. All other projects must be forwarded to the Office of Structure Maintenance and Investigations, which determines which sheets should be microfilmed for the structure files. In identifying prints to be processed, the Office of Structure Maintenance and Investigations must include all sheets prepared by the Office of Transportation Architecture. This office will then forward all the prints to the Office of Structure Design, documents unit.

- Those prints not identified for filing by the Office of Structure Maintenance and Investigations will be forwarded to the appropriate district office for the preparation of as-built plan sheets. The Office of Structure Design will make the as-built corrections on the original plan sheets. If the original plan sheet is not presently stored in the Office of Structure Design, it may be obtained from the district.

On state projects that do not have a representative from the Office of Structure Construction, the resident engineer must make the as-built changes on the full-size prints bearing "Structure" signature blocks. As soon as possible after completion of the structures, forward the prints to the Office of Structure Construction in Sacramento. The procedure outlined above must then be followed.

When the corrections have been made, the as-built plan sheets will be forwarded to headquarters microfilm services unit for microfilming and distributing.

On projects funded by others, where the local entity or private entity is the sponsor, follow the procedure for as-built plans for bridges and structures described in the Office of Special Funded Projects' *Information and Procedures Guide and* the *Encroachment Permits Manual.*

For additional guidelines and details for completing structure as-built plans, see the *Bridge Construction Records and Procedures Manual*.

5-104D (3) Projects Not on State Highways

On all district-administered projects not on state highways, the information to be included on as-builts will remain the same as for contracts on state highways. The district will be fully responsible for completing as-built project plans and forwarding them to the local agencies. If the district desires for its own records, these plans may be sent to headquarters microfilm services unit for microfilming before being returned to the local government.

The engineer responsible for structure work will place as-built corrections on structure plans of all state and federally funded projects for local roads and streets. On Caltrans administered contracts, follow normal Caltrans procedures for processing these plans. On locally administered contracts, the engineer responsible for structure work will provide the Office of Structure Design, Local Assistance Section, a set of original tracings or duplicates of reproducible quality with as-built corrections. After microfilming, return these tracings or duplicates to the local agency.

Section 2 Funds

5-201 General

5-202 Managing Funds

5-203 Obtaining Additional Funds

5-204 Segregation of Quantities for Fund Apportionment

5-204A General

5-204A (1) Requirements for Specific Types of Funding

5-204A (1a) Federal Funds for State Highway Projects

5-204A (1b) Federal or State Funds for Local Assistance Projects

5-204A (1c) Local Funds for State Highway Projects(Cooperative Projects)

Example 5-2.1 Request for Additional Funds

Section 2 Funds

Section 2
Funds

5-201 General

5-201
General

Caltrans aims to complete construction projects within the planned scope, allotted time, and projected budget. The project allotment includes a contingency fund for unforeseen expenses or unknown factors encountered during construction. Occasionally, the magnitude and cost of unforeseen expenses or unknown factors are greater than the budgeted amount. In such instances, the contract allotment may be supplemented with additional funds to complete the project as originally planned. The California Transportation Commission adopted resolutions G-11 and G-12 in 1978 to allocate funds for emergency contracts and to delegate authority for Caltrans to adjust project allocations and modify project descriptions. Those resolutions have been amended and superseded over the years. The processes are still referred to as G-11 and G-12.

5-202 Managing Funds

5-202
Managing Funds

The resident engineer is responsible for managing the project construction costs within the current allotment, which includes item payments, state-furnished materials, contingencies, and supplemental work. The resident engineer must track project expenditures, forecast future costs, determine the need for additional funds, and immediately notify the construction engineer of any apparent funding shortfalls. The resident engineer must not allow work to proceed that would require the encumbrance of additional funds before those funds have been approved and added to the project allotment.

The resident engineer must update the project contingency balance continuously as changes occur and whenever additional costs are initially identified. For example payment for item overruns will come from the contingency fund, and extra money from item underruns will be returned to the contingency fund.

5-203 Obtaining Additional Funds

5-203
Obtaining
Additional Funds

When the resident engineer determines that additional funds are needed, the resident engineer must consult with the construction engineer. Both engineers should discuss additional funds and potential alternatives to complete the project within budget.

An assessment of financial status must show that the existing contingency balance will prove insufficient to complete the project within the approved contract scope. Do not request additional funds to settle disputes that are not yet resolved.

The resident engineer and the construction engineer must next meet with the construction field coordinator and the project manager to discuss the funding need and alternatives. For emergency contracts or for maintenance funded contracts, include in these early discussions the district maintenance major damage coordinator or the district maintenance engineer respectively, and the funding program adviser.

The construction engineer must then write the memorandum to request additional funds and send it to the project manager. The memo must include sections entitled "Financial Status of the Contract," and "Justification for the Request." The "Financial Status of the Contract" section must include information on the present contract allotments and estimated probable final expenditures for contract items, supplemental work, contingency fund, state-furnished material and expenses, and any previously approved additional funds. The "Justification for the Request" section must contain a clear explanation of the reason for additional funds to complete the project within the scope indicated in the approved contract. The justification must answer the following questions:

- Why are additional funds needed?
- What work will be performed with the additional funds?
- What alternatives have been considered to mitigate the unforeseen expenses?

The construction engineer ensures that informational copies of the request are e-mailed to the Division of Construction contract reviewer and the appropriate funding program adviser. For an example of the memorandum, "Request for Additional Funds," see Example 5-2.1 at the end of this section.

The project manager must manage the project G-12 funding capacity. The project manager prepares a request for additional funds using the information in the request from the construction engineer. The project manager provides any additional information needed to complete the request, including any participation concurrence from other funding partners, and if applicable, an explanation of previously approved funding requests.

The request for additional funds must have signatures from the district construction deputy director, the project manager, and the district program/project management deputy director recommending approval. The Division of Budgets processes the request.

If the California Transportation Commission must provide a supplemental vote, the construction field coordinator, and the Division of Construction chief will also review the request for additional funds before it is forwarded in the approval process.

5-204 Segregation of Quantities for Fund Apportionment

5-204 Segregation of Quantities for Fund Apportionment

5-204A General

The recording of total quantities of materials used on a project determines the final payment to contractors. However, this recording does not complete the data necessary to prepare the final billing when projects involve several different funding sources independent of state highway funds. Therefore, resident engineers must review the expenditure authorization (EA) for each project before work begins and be alert to the necessity for segregating quantities for fund apportionment. Details about cost segregation are covered in Section 9-1, "Local Assistance Projects and Projects Funded by Others," and Section 5-309, "Fund Segregation Determination," in the *Construction Manual* (manual).

Construction projects may be funded from many different fund sources. These include the following state administered sources:

- The Interregional Transportation Improvement Program (ITIP)
- The Regional Transportation Improvement Program (RTIP)

- The State Highway Operation and Protection Program and Minor Projects (SHOPP & Minor)

Other funding sources for construction projects include the following:

- Federal Demonstration Funds
- Local tax measure funds
- Local developer fees
- State and local partnership funds, or even private funds

The project funding may come from a single source or from a combination of the above sources. The arrangements for multiple funding sources may involve each party paying a percentage of the project or each party paying for specific items or locations of work.

It is essential that the resident engineer understand the project's funding make-up and understand the agreement that establishes the funding and payment arrangements. This knowledge is important in the maintenance of records throughout the project including records for quantities, cost increases, change orders, and final apportionment. The resident engineer may need to notify, and get concurrence from, the appropriate funding source when the work changes. The project manager should make this funding information available to the resident engineer, who should then establish a contact with the funding source.

5-204A (1) Requirements for Specific Types of Funding

Here are the requirements for specific funding types:

5-204A (1a)Federal Funds for State Highway Projects
Segregate the costs for federal participation only for major change orders (as defined in Section 5-311A, "Division of Construction Approval"), maintenance work, and work financed by others. See Section 5-3, "Contract Change Orders," of this manual for details about cost segregation. Quantity or cost segregation for all other planned work is handled on a percentage basis according to the detailed estimate. No special reporting is required by the field personnel.

5-204A (1b) Federal or State Funds for Local Assistance Projects
Segregate the quantities and costs between various funds for all local assistance projects.

5-204A (1c)Local Funds for State Highway Projects (Cooperative Projects)
Quantities must be segregated for the report of expenditures and for the final billing to contributing agencies. The resident engineer must submit to the accounts receivable and program accounting unit of the Division of Accounting Services a final statement of all quantities or costs incurred as a result of agreements with contributing agencies. Segregate in sufficient detail the quantities and costs (whether covered by contract change order or resulting from normal variations) so that an accurate final breakdown can be made and the proper costs applied to each funding agency. The report should reference the original and subsequent funding agreements and any contract change orders or other items that altered the work.

Example 5-2.1 Request for Additional Funds

State of California **Business, Transportation and Housing Agency**

M e m o r a n d u m

To : _____ Date:

Project Manager

(Dist – Co – Rte – PM/KP) File:

(Dist – EA)
(Project Description)
(Prog Code / Elem / Proj Type)

From : **DEPARTMENT OF TRANSPORTATION**
District/Region - Division of Construction

Subject: Request for Additional Funds

Supplemental funds in the amount of $•••••••••• are requested for the above-referenced project. As previously discussed, following are the details supporting this request:

Financial Status of Contract

	Present Contract Allotments	Estimated Probable Final Expenditures
Contract Items	$ 00	$ 00
Supplemental Work .	00	. 00
Contingency Fund .	00	. 00
State-Furnished Materials & Expense	00	. 00
Previously Approved G-12 Funds	00	00
Totals $	00	$ 00
Estimated Deficit		00
Call (G-12 Funds Request)		$ _____ . 00

Justification for Request

- Why:
- What:
- Alternatives:

If you need additional information, please contact me at_____.

Original Signed By

_____

Construction Engineer

cc: Division of Construction Chief (e-mail, only for California Transportation Commission Vote)
Contract Specialist (Scope of Work) (e-mail)
Construction Field Coordinator (e-mail)
Contract Reviewer (e-mail)
Program Adviser (e-mail)
District Construction Deputy Director
Construction Manager (if applicable)
Resident Engineer
Project Engineer
District Construction Office

Section 3 Contract Change Orders

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5-311 Contract Change Order Approval

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Section 3 Contract Change Orders

Section 3 Contract Change Orders

5-301 General

5-301 General

A contract change order is a legally binding document used to make changes to the contract. Form CEM-4900, "Contract Change Order," is used for contract change orders. Form CEM-4903, "Contract Change Order Memorandum," must be prepared for each contract change order. This section describes the use of forms CEM-4900 and CEM-4903, describes Caltrans policies for contract change orders, and provides guidelines for writing contract change orders and memorandums.

5-302 Contract Change Order Policy

5-302 Contract Change Order Policy

For Caltrans policy limiting the scope of changes to the contract, refer to Section 3-403, "Changes" of the *Construction Manual* (manual). To add work that is outside the intent of the original contract, the district director must request approval from the Division of Construction chief. The Division of Construction chief will determine if the change is in the best interest of Caltrans.

The following are examples of changes that are not required to complete the work as it was contemplated when the plans and specifications were approved:

- Directing acceleration of the work
- Adding a sound wall on a landscape project
- Adding a portion of a future project to the current project

When writing a contract change order, the resident engineer often can choose the payment method for added or changed work. However, Caltrans has a policy of preference for the payment method. Always attempt to use the most preferred method. The following lists, in order of preference, the payment methods:

- Contract items at contract unit prices
- Contract items at contract prices with an adjustment in compensation
- Extra work at agreed unit price or lump sum
- Extra work at force account

When a contract item is changed in character, the resident engineer may delete the entire contract item, or the portion of it affected by the change, and pay for the entire work as extra work. A much better choice, though, is to determine a correct and equitable adjustment in compensation to the contract item unit price. An adjustment in compensation providing for increased or decreased costs due to the change in character allows the contract price to remain unchanged. Before resorting to force account payment, resident engineers must make every effort to make adjustments in compensation or negotiate agreed prices.

See Section 3-902, “Payment Methods,” of this manual for methods of payment. Section 3-904, “Payment for Extra Work,” describes how the various methods of payment are used in contract change orders.

Section 3-4, “Scope of work,” of this manual contains guidelines for applying the provisions in Section 4-1.03, “Changes,” of the *Standard Specifications*. Included in Section 3-4 are descriptions and guidelines for increased or decreased quantities, eliminated items, changes in character of work, and extra work.

5-303 Purpose of Contract Change Orders

5-303 Purpose of Contract Change Orders

Use contract change orders to change any part of the original contract. In addition, contract change orders are used for administrative and other purposes. The following are some of the reasons for writing contract change orders:

- To change contract plans, specifications, or both.
- To describe the work and method of payment for work stipulated in the contract to be paid as extra work.
- To authorize an increase in extra work funds necessary to complete a previously authorized change.
- To make adjustments in compensation.
- To implement a cost reduction proposal or a construction evaluated research proposal. See Section 3-5, “Control of Work,” of this manual for a discussion of cost reduction proposals and Section 3-4, “Scope of Work,” of this manual for a discussion of construction evaluated research.
- To clarify terms of the contract.
- To resolve disputes, potential claims, exceptions during the contract, after the proposed final estimate, and to pay for contract claim determinations. For the use of contract change orders in the dispute resolution process, see Section 5-4, “Disputes,” of this manual.

5-304 Initiation of Contract Change Orders

5-304 Initiation of Contract Change Orders

The resident engineer usually determines the need for and initiates a contract change order. However, the contractor, other Caltrans units, or outside agencies or individuals may request changes. Other Caltrans units requesting a contract change order must clearly document the need for the change. They must provide information sufficient to demonstrate that the requested change meets Caltrans policy for making changes to the contract. For all changes requested by any person except the contractor, indicate “Change Requested by Engineer” on Form CEM-4900, “Contract Change Order.”

5-305 Preliminary Considerations

5-305 Preliminary Considerations

When preparing to write a contract change order, consider the following:

- Is the proposed contract change order necessary to complete the work as contemplated at the time the plans and specifications were approved?
- What is the overall impact on the planned work?
- Are there sufficient unobligated contingency funds? If additional funds are required, can they be obtained soon enough to prevent delays? See Section 5-2, “Funds,” of this manual for the procedure for obtaining additional funds.

- Will the contract time be affected?
- What are the impacts of extending contract time?
- When a project is nearing completion, give careful consideration to the effect the change will have on the time of completion. Changes near the end of a contract are more apt to extend the time of completion than changes made earlier. Late changes may adversely affect the contractor's schedule, delay public use of the facility, and disrupt the planned use of Caltrans personnel.
- If the adjustment of time of completion is deferred, how will the adjustment be determined?
- Will the proposed contract change order affect or change the contractor's planned method of performing the work?
- Is the proposed work already covered in the contract?
- Will the ordered change cause a change in character of the work?
- If an adjustment in compensation resulting from a change in character of the work is deferred, how will the adjustment be determined?
- Is timely coordination with other affected Caltrans units possible? Does the proposed change adhere to existing permit conditions, environmental mitigation requirements, local agency and utility obligations, and right-of-way agreements? Does the proposed change require new coordination, permits, or agreements?
- Will the contractor cooperate in providing timely cost estimates for the extra work at the agreed price and cost information for adjustments in compensation? Should you make your own cost estimates and determinations first and present them to the contractor?
- What methods of payment should be used?

To avoid misunderstanding and obtain full agreement, discuss with the contractor all elements of a change, including the method of compensation and the effect on time. Failure to identify elements requiring consideration may lead to protest.

5-306 Contract Change Order Content

5-306 Contract Change Order Content

The contract change order must be clear, concise, and explicit. When appropriate, it must include the following:

- What is to be done
- Location and limits of proposed work
- Any applicable specification changes and references to specifications
- The proposed contract change order's effect on time of completion
- Method and amount of compensation

5-306A Specifications

The specifications for contract item work already included in the contract will apply to added contract item work. You do not need to repeat or reference specifications for added work that is clearly shown to be contract item work.

In the contract change order, completely describe extra work. Include directly or by reference the specifications for extra work, whether paid for at agreed price or at force account. The contractor must complete this extra work exactly as it is specified in the contract change order.

Included in the contract will be some work specifically designated as extra work. For an example of this situation, see Section 12-2.01, "Flaggers," and Section 12-2.02, "Flagging Costs," of the *Standard Specifications*.

The contractor normally chooses the method of performing extra work, subject to the resident engineer's approval for labor, equipment, and materials for force account work. If, for any reason, the engineer wants to control the method of performing the work, the method must be specified in the contract change order.

5-306B Description of Work

The contract change order must clearly describe added work or other changes to the contract. Include appropriate references to special provisions, contract plans, *Standard Plans*, or *Standard Specifications*. Decide if a written statement clearly defines the proposed change or if plans or drawings need to be included.

On plans attached to a contract change order, show pertinent dimensions and the scale or label the plans "not to scale." Plainly mark reduced reproductions "Reduced Plans, Scales Reduced Accordingly." When using existing plan sheets, clearly show the difference between new work, work already included in the contract, and changed or eliminated work. A simple sketch on a letter-sized sheet will more clearly depict the change than an obscure revision to an existing sheet of the original plans. An 8.5" x 11" attachment is always preferable to a full-size contract plan sheet.

Section 6735, "Preparation of Plans and Other Documents," of the Business and Professions Code, requires that a registered civil engineer signs and stamps or seals all civil engineering plans and specifications. Plans or specifications attached to a proposed contract change order must meet this requirement. A registered civil engineer does not need to sign revisions already covered by *Standard Plans*, *Standard Specifications*, standard special provisions, previously engineered drawings, or minor changes not requiring calculations or determinations by a registered engineer.

Show the Caltrans contract number, sheet number, and contract change order number on plans or other documents made a part of a contract change order. Include all attachments to each distributed copy of a contract change order.

5-306C Methods of Payment

This section provides guidelines for using the various methods of payment in contract change orders.

5-306C (1) Increases and Decreases in Contract Items at Contract Prices

Changes in planned work or adding or decreasing work will often result in increases or decreases in contract item quantities. Except for contract items designated in the engineer's estimate as final pay quantities, show changes in contract item quantities as estimates on a contract change order. Calculate the estimated increases or decreases that will result from the work as changed by the contract change order. The actual quantity paid for each contract item will be determined by the method specified for measuring each contract item quantity. For guidelines on measuring contract item quantities, see Section 3-9, "Measurement and Payment" of this manual.

Show changes in the quantity of contract items that are designated as final pay quantities as fixed amounts added to the quantity shown in the engineer's estimate. Calculate the increase or decrease in the final pay quantity by the method specified in Section 9-1.015, "Final Pay Items," of the *Standard Specifications*. For a standard clause for revised final pay quantities, see "Contract Change Order Standard Clauses" later in this section.

For the method of indicating changes in contract item quantities, refer to "Contract Change Order Format" later in this section and see the example contract change orders, Example 5-3.7, Example 5-3.9, and Example 5-3.10, at the end of this section.

5-306C (2) Extra Work

For the definition of extra work and guidelines for using extra work in contract change orders, see Section 3-4, "Scope of Work," of this manual. Before designating additional work as extra work, ensure that it cannot be paid for as a contract item, a combination of contract items, or a contract item with an adjustment in compensation.

5-306C (2a)Extra work at agreed prices

For guidelines for determining and paying for extra work at agreed price, see Section 3-9, "Measurement and Payment" of this manual.

File with the contract records any calculations made to determine extra work at agreed price. These calculations are subject to audit and must be in such a form that they clearly substantiate and justify the amount paid for extra work. In lieu of showing all the calculations necessary to substantiate extra work at agreed price in the change order memorandum, you can include a statement that such calculations are on file in the project records.

When a subcontractor is to perform extra work paid for by agreed price, include the subcontractor markup in the agreed price calculations. For subcontractor markup guidelines, see Section 3-9 of this manual.

Agreed prices may be unit prices or lump sum. Before an agreed price may be used to pay for extra work, the resident engineer and the contractor must agree on compensation. The contractor must execute the contract change order providing for extra work at agreed price.

After the extent of extra work has been determined, request the contractor to submit a proposed agreed price. Analyze the contractor's proposed price using the force account method. You may also initially determine a proposed agreed price based on a force account analysis and present it to the contractor. When you have reached an agreement, process the contract change order and retain in the project files the records fully justifying the agreed price.

Ensure that payments of agreed lump sum prices do not exceed the amount authorized on the change order. Agreed unit prices can be applied to an estimated number of units in the contract change order. Although the unit price remains fixed, the number of units paid for may vary from the estimated number.

When extra work consists entirely of work that neither the contractor nor any of the subcontractors would normally perform, the work is considered "specialty work," and the contractor may obtain three bids for the extra work. Determine the agreed price by taking the lowest bid and adding the markup, as described in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the *Standard Specifications*. When this method is used, ensure that the work is accurately and completely described when bids are solicited. The same

description of the work must be used in the contract change order. If the contractor or a subcontractor includes a bid along with independent firms, you must make an analysis using the force account method. The contractor's or subcontractor's bid will be acceptable only if the analysis can justify it.

For examples of contract change orders with extra work at agreed price, see Example 5-3.2 and Example 5-3.10 at the end of this section.

5-306C (2b) Extra work at force account
Pay for extra work at force account under the following conditions:

- When the work cannot be estimated within reasonable limits of accuracy.
- When the resident engineer and the contractor are unable to agree on a unit or lump sum price for the work.

For guidelines for paying for extra work at force account, see Section 3-9, "Measurement and Payment," of this manual. For examples of contract change orders with extra work paid for on a force account basis, see Example 5-3.1 and Example 5-3.7 at the end of this section.

5-306C (3) Adjustment in Compensation

For definitions of adjustments in compensation, see Section 3-9 of this manual. Section 3-4, "Scope of Work," of this manual discusses adjustments in compensation for increased or decreased quantities and for changes in character of work.

Adjustments in compensation usually involve estimating the cost of work or determining the actual cost of work performed. The following explains how to estimate or determine such costs.

Verify the contractor's records of item cost by comparing labor and equipment charged to the item by the contractor to the labor and equipment shown on the daily reports. Charge equipment to the item cost in accordance with the force account method. Exclude down time, and apply the correct force account rental rates. Exclude any overhead costs and any items that should be charged to other work.

Sometimes a contractor may submit cost estimates based on the billing from a specialist plus a markup. When the work is of such a nature that it would qualify under Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the *Standard Specifications*, you may calculate the adjustment on this basis. Ensure the specialist rate or billing is in line with the firm's usual charges.

For contract item overrun and underrun adjustments, when the contractor does not furnish sufficient and timely cost information, issue a unilaterally approved contract change order adjusting the item. Base the adjustment on your cost determination. This approved contract change order establishes the time allowed for protest and helps avoid problems and delays after contract completion.

Even though the contractor may have agreed to pay a fixed price to others for an element of work, you can still use a force account based adjustment of the item price. You must use a force account cost determination even when the work is subcontracted unless the element of work was performed by special forces, as defined in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the *Standard Specifications*.

For large and complex adjustments, request auditing assistance from the Division of Accounting Services through the Division of Construction.

5-306C (3a)Adjustments for increased or decreased quantities

As soon as it is known that a contract item quantity will vary from the engineer's estimate by more than 25 percent, consider the method of adjustment that will be used. Make daily reports for the item with the same degree of detail used in force account daily reports. Doing so will facilitate determining any necessary adjustment. When required, make adjustments in compensation for increased or decreased quantities as soon as the contractor completes work on a contract item.

You may calculate adjustments by analyzing the performance of a portion of an item, provided the portion is typical of the item as a whole.

You may verify a contractor's records by comparing them with Caltrans records. Where more extensive auditing is required, request the assistance of the Division of Accounting Services. When examining the contractor's records to determine the cost of equipment used, consider only the hours worked. Force account equipment rental rates must be used regardless of what rate the contractor may have used. When verifying contractor's records, eliminate supervision and overhead costs and any items of costs properly chargeable to other work.

When making adjustments, use Caltrans records to determine the amounts of labor, equipment, and materials. The verified contractor's records may supplement the Caltrans records, or in some instances, you may need to use only the verified contractor's records. The resident engineer must use good judgement when reconciling differences between the contractor's and the engineer's records to arrive at a reasonable and equitable adjustment.

An item that has been adjusted under the provisions of Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications*, may later become eligible for further adjustment under Section 4-1.03B, "Increased or Decreased Quantities," of the *Standard Specifications."* In making the quantity adjustment, deduct or add payments made in making the change in character adjustment to determine the contractor's total cost of the work.

5-306C (3b) Adjustment calculations involving asphalt concrete dikes and miscellaneous areas

The contract item "asphalt concrete dike" is paid for by the tonne of asphalt concrete and by the meter for asphalt concrete dike. The contract item "asphalt concrete (miscellaneous areas)" is paid for by the tonne of asphalt concrete and by the square meter for asphalt concrete (miscellaneous areas). The specifications do not exactly separate the work covered under each contract item. This lack of separation causes a problem when it is necessary to adjust either the asphalt concrete dike contract item or the asphalt concrete (miscellaneous areas) contract item.

Although a change in character is not actually involved, the procedure is considered the most equitable to compute the adjustment somewhat in conformance with change in character methods.

The following is the recommended procedure to determine the proper costs for computing adjustments of asphalt concrete dike and asphalt concrete (miscellaneous areas):

- Subtract the estimated normal haul and laydown unit cost for asphalt concrete used in paving from the contract unit price to determine the cost of producing asphalt concrete. For commercial plants, you may use published price lists to determine the cost of producing asphalt concrete.

- To obtain the total cost of producing asphalt concrete used in dikes or miscellaneous areas, multiply the actual mass of asphalt concrete used for dikes or miscellaneous areas by the unit cost of asphalt concrete as determined above.
- To obtain the total force account cost of dikes or miscellaneous areas, add to the total cost of producing asphalt concrete the total force account haul and placing costs for asphalt concrete used in dikes or miscellaneous areas.
- Calculate the force account unit cost of the dike or miscellaneous area item and proceed as with any contract item increase or decrease adjustment.

To some extent, this procedure constitutes an adjustment in the asphalt concrete item as well as in the placing item. However, this statement is true only for the asphalt concrete used on that portion of the dike or miscellaneous areas in excess of 125 percent of the engineer's estimate. Also, an overrun or underrun in asphalt concrete dike or asphalt concrete (miscellaneous areas) will usually have little effect on the overall quantity of asphalt concrete.

5-306C (3c) Deferred contract item adjustments:
If adjustment was deferred on the original contract change order, you may write a supplemental contract change order to resolve the adjustment.

To simply indicate an item adjustment will not be made, you do not need to write a supplemental contract change order. In this case, a letter from the contractor is sufficient. File a copy of the contractor's letter with the original contract change order that deferred the adjustment.

Upon completion of the changed work, promptly resolve all deferred item adjustments.

5-306C (3d) Exemption from adjustment:
Unless requested in writing by the contractor, do not adjust a contract item when the total pay quantity is less than 75 percent of the engineer's estimate. You also do not need to adjust (unless requested in writing by the contractor) if the value based on the contract price for the units of work in excess of 125 percent is less than an amount shown in Section 4-1.03B(1), "Increases of More Than 25 percent," of the *Standard Specifications*. As soon as a final contract item quantity is known, decide whether to make the adjustment. Unless an obvious imbalance exists between the contract unit price and actual cost, do not make the adjustment. Inform the contractor in writing whether or not Caltrans will adjust the contract item price.

5-306C (3e)Adjustments for changes in character of work:
Section 3-403, "Changes in Character of Work," of this manual defines changes in character of work.

Adjustments in compensation for changes in character may be unit or lump sum adjustments. A lump sum adjustment is normally only applied to a lump sum contract item.

A change in character adjustment may require a force account determination of the cost of an entire item as changed and a force account estimate of the cost of the work as planned.

When the changed portion of the work can be separated from the unchanged portion, only a force account determination of the cost of the changed portion is necessary. You can make payment at the contract price plus a separate payment for the added work or credit for any deleted work. When added work is clearly

separable from the planned item work, pay for it as a lump sum or unit adjustment in compensation. You may also pay clearly separable added work as extra work at agreed price or force account. For work deleted from the original item work, make an adjustment in compensation (credit) for the deleted portion.

Do not eliminate a contract item and pay for the work at agreed price or force account unless the change is so extensive that the original item no longer applies. Never change a contract bid price. Instead, make an adjustment to the contract bid price.

Changes in character can only result from an ordered change in the planned work. At times, it will not be possible to come to an immediate agreement with the contractor regarding adjustment of compensation. You may need to complete the entire item before costs can be determined. In such cases, provide for payment at contract prices, and defer adjustment in the initial contract change order. Include an appropriate deferment clause.

5-306D Adjustments to Time of Completion

For a discussion of time of completion and extensions of contract time, see Section 3-805, "Time of Completion," of this manual.

A contract change order may specify a positive, negative, or zero adjustment to time of completion.

Whenever you can estimate an adjustment in contract time with reasonable accuracy, try to reach agreement with the contractor. Enter the amount of the adjustment on the change order (including zero adjustments). Regardless of the amount of time actually required, the agreed adjustment becomes binding on both parties. File with the contract records the calculations and other data used to determine adjustments of contract time.

If you cannot determine or agree on an adjustment of contract time in the initial contract change order, you may defer the adjustment. When doing so, write "deferred" on the time adjustment line and include a time adjustment deferred clause in the contract change order.

As soon as the contract change order work is completed, determine the appropriate contract time adjustment. If you cannot reach agreement with the contractor, issue a unilaterally approved supplemental contract change order adjusting contract time.

On contracts with internal time limits or multiple time limits, ensure any contract change order that includes a time extension contains a statement that identifies the time limit(s) to which the extension applies. If an internal milestone date will change, but total contract time remains unaffected, specify the new date in the contract change order and indicate a zero time adjustment.

Periodically during the progress of the contract change order work, resolve extensive deferred time extensions. Do so by issuing a supplemental contract change order covering time allowable to a given date, with the deferment continued for subsequent work. Your objective is to resolve deferred time extensions as soon possible. By doing so, the contractor can better schedule remaining work so as to complete the project within the contract time limits.

The resident engineer may not unilaterally decrease contract time unless this is permitted by the contract specifications. Otherwise, the contractor must agree to changes that reduce contract time. Without this agreement, you can do one of two things:

1. Do not recommend approval of the change if no benefit exists for Caltrans.

2. If substantial benefits exist for Caltrans, issue a unilaterally approved contract change order with no adjustment in contract time.

5-306E Contract Change Order Standard Clauses

The following are examples of standard clauses for specific situations found in various types of contract change orders. Note that any items in brackets are not part of the clause, but are instructions to you in using the clause. In using any of these clauses, ensure that the clause states what is appropriate for your contract change order.

Situation 1: Adjustment Deferred for Increase in Quantities in Excess of 125 Percent of the engineer's estimate

> Standard Clause for Situation 1:
>
> Any adjustment due in accordance with Section 4-1.03B(1), "Increases of More Than 25 Percent", of the *Standard Specifications* for contract item(s)
>
> No. _____ is deferred.

Situation 2: Adjustment for Increase in Quantities in Excess of 125 Percent of the engineer's estimate

> Standard Clause for Situation 2:
>
> Adjustment in compensation in accordance with Section 4-1.03B(1), "Increases of More Than 25 Percent," of the *Standard Specifications*:
>
> The following adjustment(s) will be made for units of work in excess of 125 percent of the engineer's estimate:
>
> [List the contract item(s), unit adjustments, quantities, and total item adjustment(s).]
>
> Or [for a single contract item]:
>
> In accordance with Section 4-1.03B(1), "Increases of More Than 25 Percent," of the *Standard Specifications*, the adjustment of the contract unit price for the quantity in excess of 125 percent of the engineer's estimate for contract item No. _____ [item description] will be $____ per _____ increase [or decrease].
>
> [When you know the total pay quantity, you may apply the unit adjustment to a fixed quantity for an exact total adjustment. When the total pay quantity has not yet been determined, you may apply the unit adjustment to an estimated quantity for an estimated total adjustment.]

Situation 3: Adjustment Deferred for Decrease of More Than 25 Percent

> Standard Clause Situation 3:
>
> Any adjustment due in accordance with Section 4-1.03B(2), "Decreases of More Than 25 Percent," of the *Standard Specifications* for contract item(s) No. ____, [item title] is deferred.

Situation 4: Adjustment for Decrease of More Than 25 Percent

Standard Clause for Situation 4:

Adjustment in accordance with Section 4-1.03B(2), "Decreases of More Than 25 Percent," of the *Standard Specifications*:

The following adjustments will be made for contract items that underran the engineer's estimate by more than 25 percent:

Or [for a single contract item]

In accordance with Section 4-1.03B(2), "Decreases of More Than 25 percent," of the *Standard Specifications*, the adjustment of the contract unit price for contract item No. _____ (item description) will be $_____ increase.

[Normally, in the case of an underrun, you must know the total pay quantity before determining the adjustment. It is usually more convenient to show the adjustment as a lump sum amount because of the specified limit of 75 percent of the engineer's estimate for total compensation.]

Situation 5: No Adjustment due to Increases or Decreases of More Than 25 Percent of the engineer's estimate

Standard Clause Situation 5:

No adjustment(s) to the contract unit price of item(s), No.____ [item title], will be made in accordance with Section 4-1.03B(1), "Increases of More Than 25 Percent," of the *Standard Specifications*. [Or for decreases, use Section 4-1.03B(2), "Decrease of More Than 25 Percent", of the *Standard Specifications*.]

Or [When waiving adjustments for both increases and decreases]

There will be no adjustment for items No. _____ and No. _____ [item titles] in accordance with Section 4-1.03B, "Increased or Decreased Quantities," of the *Standard Specifications* by reason of this contract change order.

[The contractor must be in agreement and execute the contract change order before adjustment in compensation for increased or decreased quantities is waived.]

Situation 6: Adjustment Deferred Due to Possible Change in Character

Standard Clause for Situation 6:

Any adjustment due in the contract unit price(s) of item(s) No. ___, [item title] in accordance with the provisions in Section 4-1.03C, "Change in Character of Work," of the *Standard Specifications*, is deferred.

Situation 7a: Eliminated Item, Adjustment Deferred

Standard Clause for Situation 7a:

Any adjustment due in accordance with Section 4-1.03B(3), "Eliminated Items," of the *Standard Specifications* of contract item No.____ will be deferred until all incurred or unavoidable costs can be determined.

Situation 7b: Eliminated Item, Adjustment Determined

Standard Clause for Situation 7a:

In accordance with Section 4-1.03B(3), "Eliminated Items," of the *Standard Specifications*, the adjustment due to the elimination of item(s) No. _____, [item title] is zero. [Or replace zero with whatever costs the contractor has incurred.]

Situation 8: Revised Final Pay Item Quantities

Standard Clause for Situation 8:

The quantity increase shown herein for item No. ____, [item title] when combined with the quantity shown in the engineer's estimate, and as modified by any previous change orders or revisions to dimensions made by the engineer, shall be the final quantity for which payment will be made.

Situation 9: Extra Work or Adjustment in Compensation at Agreed Unit Price

Standard Clause for Situation 9:

For this work, the contractor shall receive and accept $ __ per [unit] of [pipe, fence, among other items]. This sum constitutes full and complete compensation for furnishing all labor, material, equipment, tools, and incidentals including all markups by reason of this change.

Situation 10: Extra Work or Adjustment in Compensation at Agreed Lump Sum Price

Standard Clause for Situation 10:

For this work, the contractor will be paid the sum of $ ___. This sum constitutes full and complete compensation, including all markups for this change.

Or

For this work, the contractor shall receive and accept the agreed lump sum of $ ____. This sum constitutes full and complete compensation for providing all labor, material, equipment, tools and incidentals, including all markups by reason of this change.

Or

For this reduction, the contractor agrees to [or will] credit [or pay] the state a lump sum of $ ___. This sum constitutes full and complete compensation, including all markups for this change.

Or

The state will accept a lump sum payment of $ ___ as full compensation for this change.

Or

The contractor shall credit the state $ ___ for each [unit] of item(s) No. ____ [item title]. This sum constitutes full and complete compensation for this change.

Or

There shall be no cost or credit to the state by reason of this change.

Situation 11: Time Adjustment

Standard Clause for Situation 11:

Consideration of a time adjustment will be deferred until completion of the work specified in this contract change order. A determination of a time extension will be made in accordance with Section 8-1.07, "Liquidated Damages," of the *Standard Specifications*.

Or

A determination of the delay in completion of the contract due to the work specified by contract change order No. ____ has been made in accordance with the provisions of Section 8-1.07, "Liquidated Damages," of the *Standard Specifications*. [Add either of the following sentences to this clause]

Contract change order No. _____ was the controlling item of work for the following dates: [list dates—mm/dd/yy].

The contractor shall be granted [number] working days for the following dates: [list dates—mm/dd/yy].

Or

A determination of the delay in completion of the contract due to work specified by contract change order No. ___ for work performed from [mm/dd/yy] to [mm/dd/yy] [or on mm/dd/yy] has been made. Consideration of time extension for the remaining work continues to be deferred.

Situation 12: Deferred Adjustment for Right-of-Way Delay

Standard Clause for Situation 12:

Any adjustment in compensation due to possible delays to the work resulting from this change is deferred until completion of the work. The adjustment will be made in accordance with Section 8-1.09, "Right of Way Delays," of the *Standard Specifications*.

Situation 13: Adjustment in Compensation for Overhead Costs

Standard Clause for Situation 13:

In accordance with Section 9-1.08, "Adjustment of Overhead Costs," of the *Standard Specifications*, compensate the contractor the total sum of $ ___ to cover overhead costs.

Situation 14: Claim Settlement

Standard Clause for Situation 14:

Payment indicated in this contract change order provides for full settlement of all claims on this contract [or the contractor's claim No. ____.]

Or

Grant the contractor [number] working days, reducing the overrun in contract time by [number] calendar days, which provides for full settlement of all claims on this contract.

Or

This contract change order resolves notice of potential claim No. ____, dated [date].

5-306F Work Designated as Extra Work in the Specifications

The *Standard Specifications* and the special provisions describe certain work and specify that it is to be paid for as extra work. In some cases, supplemental funds are set aside to pay for this extra work. Make an independent cost estimate of the work for which the supplemental funds were provided. This estimate must be as accurate as possible.

Refer to the specific section of the specifications that identifies the extra work in the contract change order. Also, describe the exact work to be performed.

Traditionally, Contract Change Order No. 1 provides for extra work specified for public traffic and public convenience. This contract change order must be limited to the following:

- Work designated as extra work in the specifications
- Work related to the needs of public traffic or for public convenience

Refer to the example contract change order, Example 5-3.1, at the end of this section. This contract change order indicates the method for incorporating specified extra work into a contract change order. Note that the example contract change order is written as extra work at force account. You may also pay for specified extra work as extra work at agreed price if the extent of the work can be accurately determined. This approach is illustrated in the example contract change order, Example 5-3.2, which provides for payment for flaggers at an agreed unit price. Payment for flaggers at an agreed price may be written as a separate contract change order or combined with the other traffic related work paid for as extra work at force account.

5-306G Contract Change Order Format

The example contract change orders at the end of this section follow the generally accepted format for writing contract change orders. The following describes the format:

- Describe the work or the change that will cause increases and decreases to contract item quantities. Refer to any attached drawings or documents (sheets __ and _____ of _____). If the contract item work cannot be described separately from other work, describe the entire work at this stage. Describe work paid for

by other methods in the appropriate sections of the contract change order. The intent is that the contract change order clearly specifies the work paid for by each payment method.

- Show the increases and decreases in contract item quantities. Include the percent of the engineer's estimate represented by this change. Also show the accumulated change to date from the original quantity in the engineer's estimate.
- Write clauses for situations resulting from increases or decreases in contract item quantities (deferred adjustments or actual adjustments in compensation for overruns or underruns).
- Write clauses for adjustments or deferred adjustments in compensation due to any cause. Describe the work or change causing the adjustment or deferred adjustment. Show the amounts of adjustments.
- Describe work to be paid for as extra work at agreed price. Show the price agreed. Agreed prices may be fixed unit prices and an estimated or actual number of units, or agreed prices may be fixed lump sums.
- Describe the work to be paid for as extra work at force account. Show the estimated cost of the extra work.
- Write time deferment or time extension clauses.

5-307 Contract Change Order Memorandum

5-307 Contract Change Order Memorandum

Include with all contract change orders sufficient documentation to explain what the change does and why it is needed. For this purpose, use Form CEM-4903, "Contract Change Order Memorandum," with any necessary attachments. The memorandum is intended for interdepartmental use only. Do not send the memorandum to the contractor.

The memorandum must be sufficiently complete to enable a person unfamiliar with the details of the project to review the contract change order and determine the justification for the work, the reasonableness of the compensation, and the time extension provisions.

5-307A Contents of the Memorandum

Include the following in the memorandum:

- State what the contract change order provides. Supplemental contract change orders should also include a description of the original contract change order.
- Explain why the change is needed. When another Caltrans unit requests a change, the correspondence requesting the change should also justify the need for the change. Attach supporting letters to the memorandum.
- State why a particular method of payment was chosen. Include a complete cost analysis, or state that the cost analysis is on file with the project records. The statement should include the method used in making the cost analysis.
- Explain why the ordered change causes any change in the character of the work. To substantiate why any additional compensation is due, you may need to provide a summary of events leading up to the change.
- State the extent of coordination and concurrence. If agreement with any district unit cannot be obtained, then indicate specifically what was said and why it should or should not influence a decision for approval. See Section 5-307C, "Coordination and Concurrence by Others" in this section.

- If prior approval of the change order has been obtained, state the name of the person who granted prior approval and the date.
- Show the unobligated balance of funds remaining after this contract change order. The resident engineer must ensure the available funds are not exceeded. For obtaining additional funds, see Section 5-2, "Funds," of this manual.
- Show the total authorized funds to date, including the dollar amount of all supplements to this contract change order.
- Indicate when funds for supplemental work shown in the detailed estimate of job cost are used in the contract change order.
- For major changes on federal "oversight" projects, indicate the name and date of discussion and concurrence, if any, by the Federal Highway Administration (FHWA) transportation engineer. For details relating to federal funding to be shown on the contract change order memorandum, see "Federal Requirements," "Federal Funding," and "Determining Federal Participation" in this section.
- For change orders involving participation by local agencies, identify the portion of the work that is applicable to the contributing agency.
- For a contract change order that is to be unilaterally approved, explain why the contractor will not sign it or why the contractor's signature is not required. Attach a copy of any correspondence from the contractor regarding the contract change order.
- Include justification for a contract time adjustment. Describe the method used to determine time extensions. State what operation controlled time during the delay period. Whenever possible, and when resolving a previously deferred time adjustment with a time extension, indicate the specific calendar or working days represented by the time extension. By indicating the specific days, you ensure that other time extensions do not cover the same time period.

5-307B Contract Change Order Category Codes

Apply a category code designation to all contract change orders. Obtain a list of the codes from the district or the Division of Construction contract reviewer. Enter the category code on the contract change order memorandum and on Form CEM-4901, "Contract Change Order Input." The three-character alphanumeric code identifies the type and possible cause of the contract change order.

The first numeric character in the category code identifies the "group." The second alpha character identifies the "type" of change within that group. The last character identifies the "originator" or source of the contract change order. On Form CEM-4901, a field is provided for a fourth character for possible future use. Left-justify all category codes within the data field provided.

Contract change orders that code the resident engineer as the "originator" include the following:

- Contract change orders that authorize work designated as extra work in the specifications.
- Contract change orders providing for disposal of buried man-made objects or resulting from differing site conditions.
- Administrative contract change orders such as those establishing a dispute review board or providing for partnering.
- Contract change orders providing for paying interest on late payments.

Show the responsible district unit as the originator in the case of the following:

- Design errors or omissions.
- Conflicts with field conditions that existed at the time of design.
- Right-of-way obligations not completed.
- Unresolved utility conflicts.
- Lack of coordination with regulatory or other agencies.
- Ambiguities in the contract documents.

Show any other district unit requesting a change as the originator. The contractor is the originator on a contractor requested contract change order, including a cost reduction incentive contract change order.

In a supplemental contract change order, use the same code used in the original.

Should questions arise as to which particular code best represents the proposed contract change order, contact the Division of Construction contract reviewer.

5-307C Coordination and Concurrence by Others

Secure recommendation or concurrence from affected functional units and other agencies. Concurrence is evidence of agreement with a change in the contract and does not constitute approval of a contract change order. Process all contract change orders for approval as described in Section 5-311, "Contract Change Order Approval."

Use procedures established in the district for circulating contract change orders for concurrence. If contacted parties are unresponsive, in the contract change order memorandum, state the facts and what was done instead to ensure the proposed change is appropriate. Obtaining concurrence is not intended to cause delay to the project.

The following lists some of the Caltrans functional units and reasons for seeking their concurrence.

5-307C (1) Project Development

The project engineer must concur with all design-related contract change orders, including plan or specification changes and cost reduction proposals. You may obtain design assistance from the project engineer on some of the more complex design changes. Remember that the project engineer is the engineer of record, and unless the project engineer is consulted the resident engineer may not know why some design decisions were made.

By coordinating with the project engineer on all design and specification contract change orders, a continuous "constructability review" process develops. Cooperation between design and construction personnel will result in better plans and specifications and fewer contract change orders. Cooperation will also reduce potential for construction delays, limit negative effects on the contractor, and lessen the potential for contract claims.

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 13-4, "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 Requirements

5-308 Federal Requirements

All federally funded projects are classified as either "Exempt" or "Nonexempt." The letter "E" at the end of the federal project number indicates that the project is exempt from federal oversight requirements. The letter "N" at the end of the federal project number indicates that the project is subject to Federal Highway Administration (FHWA) review and oversight. The following sections include guidelines for both "E" and "N" projects.

5-308A Federal Highway Administration Contract Change Order Prior Approval

For "N" projects, early communication with the FHWA transportation engineer is essential to ensure full compliance with all federal requirements. Before proceeding with a proposed change, the resident engineer must obtain written and signed prior approval for major contract change orders on all "N" projects. For a definition of a major contract change order, see Section 5-311A, "Division of Construction Approval" later in this section. You may obtain same-day verbal prior approvals by telephone from the FHWA transportation engineer. Following the verbal prior approval, the FHWA transportation engineer will send a signed written concurrence to the resident engineer. The resident engineer may arrange with the FHWA transportation engineer to have the prior approval sent electronically.

5-308B Federal Funding

The resident engineer must determine if contract change orders on both "E" and "N" projects are federally participating, nonparticipating, or participating-in-part.

For "N" projects, the Division of Construction sends the complete contract change order package to the FHWA after approval of the contract change order. The FHWA transportation engineer will determine FHWA participation, sign the package, and return it to the Division of Construction. After receiving the package from the Division of Construction, the resident engineer will file it with the project records. Upon completion of an "N" project, the resident engineer must obtain any missing determinations directly from the FHWA transportation engineer.

5-308C Determining Federal Participation

Determine eligibility for federal fund participation for all contract change orders. Mark Form CEM-4903, "Contract Change Order Memorandum," accordingly. A change may be "participating," "participating-in-part," or "nonparticipating." If that particular project has no federal funds, indicate "none" on Form CEM-4903. Make every effort to avoid using participating-in-part contract change orders. Use a separate contract change order, if possible, for portions of work that are nonparticipating.

A participating contract change order means that the proposed contract change order work was listed in the federal detail estimate to be federally participating and is considered necessary for the project to function as intended.

Nonparticipating contract change orders are those authorizing work not listed in the detail estimate. Most changes will be participating provided they are necessary to complete the project as originally contemplated at the time the plans and specifications were approved. However, proposed contract change order work not included in the detail estimate is federally nonparticipating.

In addition, the following are some items that are normally nonparticipating:

- Guarantees other than electrical or mechanical.
- Electrical or mechanical guarantees over six months.
- Delivery of salvaged material off the project.
- Utility work that is considered "betterment" or "work not programmed."
- Plant establishment periods of more than one year.
- Work outside project limits.
- Right-of-way obligation not programmed.

- Right-of-way obligation already compensated.
- Work chargeable to other agencies.

Portions of contract change orders covering work chargeable to other agencies are nonparticipating regardless of the amount of such work. Mark the headquarters and district copies of such contract change orders as "paid for by others" and "nonparticipating." For additional information, see Section 5-310, "Locally Funded State Highway Projects" later in this section.

- Work not in accordance with approved specifications, unless quality is not reduced.
- Nonhighway related work.
- Work not in accordance with the standards of the American Association of State Highway and Transportation Officials (unless an exception is granted by the FHWA).
- Work done before the proper authorization is received.
- Work over and above the amount programmed.
- Deviations from design standards.

Nonparticipating contract change orders (or portions thereof) covering work classified as maintenance are nonparticipating regardless of the amount of maintenance work. Mark the headquarters and district copies of such contract change orders accordingly.

Maintenance work is not easily defined, so before making a determination, discuss questionable items with the contract change order desk in the district or with the Division of Construction contract reviewer. An example of maintenance work is cleaning an existing culvert that is not included in the planned work. This task would be considered maintenance work and, therefore, nonparticipating, regardless of the amount of work involved. However, work defined in the contract as maintenance, such as detour maintenance specified in Section 4-1.03D, "Detours'" of the *Standard Specifications*, is considered participating.

If the contract change order is entirely participating or nonparticipating, no further action is required. However, if the contract change order is participating in part, determine the respective amounts. Provide a preliminary estimate of these amounts on the contract change order memorandum with an explanation of the basis for this determination.

As soon as work on a contract change order is completed, make a final determination of participating and nonparticipating amounts. Write the amounts on a copy of the contract change order and forward the copy to the Division of Construction.

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.

Before you can process a contract change order that changes a contract's scope, the Division of Construction chief must approve a best interest letter. For more information, see Section 5-302, "Contract Change Order Policy," early in this section.

On nonexempt (suffix "N") interstate projects, items 1 through 4 above are considered major contract change orders and require FHWA approval before commencing the work authorized by the contract change order. For more information, see "Federal Highway Administration Contract Change Order Prior Approval" earlier in this section.

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 federal oversight (nonexempt) 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 No Adjustment 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 Pay Items (Extra Work at Agreed Price)
Example 5-3.11	Adjustment for Asphalt Price Fluctuation (Adjustment in Compensation)

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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

ITEMS	THIS REQUEST	TOTAL TO DATE
	$ 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

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 2

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
1				

TO Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate

Extra Work at Force Account:

Furnish flaggers in accordance with Section 7-1.08,"Public Convenience," and Section 7-1.09, "Public Safety," of the *Standard Specifications*. Furnishing flaggers will be paid for as specified in Section 12-2.02, "Flagging Costs," of the *Standard Specifications*.

Repair damage to detours caused by public traffic in accordance with Section 4-1.04, "Detours," of the *Standard Specifications*.

In accordance with Section 7-1.08, "Public Convenience" of the *Standard Specifications*:

Except as otherwise provided for construction area signs in Section 12, "Construction Area Traffic Control Devices," of the *Standard Specifications*, furnish, install, and remove sign covers.

Furnish a pilot car and driver for the purpose of expediting the passage of public traffic through the work under one-way controls.

In order to expedite the passage of public traffic through or around the work and where ordered by the engineer, furnish and install signs, lights, flares, temporary railing (Type K), barricades, and other facilities, not to be paid for as separate contract items.

Perform work ordered by the engineer for the accommodation of public traffic after the roadbed has been brought to a smooth and even condition and prior to commencing subgrade operations.

Shape shoulders and reshape subgrade as necessary for the passage of public traffic thereon during subgrade preparation on paving operations.

Apply water for the purpose of controlling dust caused by public traffic only in accordance with Section 10-1.04, "Payment," of the *Standard Specifications*.

In accordance with Section 12-4.01, "Measurement and Payment," of the *Standard Specifications, do the following*:

After initial placement of barricades, and if ordered by the engineer, move barricades from location to location.

Move temporary railing (Type K) laterally when ordered by the engineer and when such repositioning is not shown on the plans.

Furnish, erect, maintain, move, and remove additional construction area signs when ordered by the engineer.

In accordance with Section 10-1.xx, "Temporary Crash Cushion Module," of the *Special Provisions*

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 2 **of** 2

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
1				

Repair crash cushion modules damaged by public traffic.

When ordered by the engineer, reposition crash cushion modules when such repositioning is not shown on the plans.

In accordance with Section 10-1.xx, "Traffic Plastic Drums," of the *Special Provisions*, after initial placement move plastic traffic drums from location to location when ordered by the engineer.

Estimate of extra work = $20,000.00

Estimated Cost: : ☐ Decrease ☒ Increase $ 20,000.00

By reason of this order, the time of completion will be adjusted as follows: **No Adjustment**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

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CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 (OLD HC-39 REV. 6/93) CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-PM FED NO.
FROM Resident Engineer	
CCO NO. 2 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 230,000.00
$ 48,302.80 ☒ INCR ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☒ NO
SUPPLEMENTAL FUNDS PROVIDED $ 60,000 for flagging and traffic control	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This change order provides for

Flagging in accordance with Section 12-2.02, "Flagging Costs," of the *Standard Specifications*. Payment for flaggers and furnishing flaggers as extra work under this contract change order will be made at agreed unit (hourly) prices. Hourly costs, based on prevailing wage rates with force account markups applied have been determined for laborers and for the contractor's foremen.

The straight time and overtime rates for foremen include the cost of a pickup truck at the specified equipment rental rate.

The *Standard Specifications* provide that an additional 5 percent markup is added to the cost of extra work at force account performed by a subcontractor. The hourly rates shown in the contract change order for the subcontractor's employees include the additional 5 percent markup.

In case there is a change in prevailing wages or labor surcharge rates affecting the cost of flaggers and furnishing flaggers, a supplemental contract change order will be written to revise the hourly agreed prices.

Calculations used to determine the agreed prices are on file with the project records.

This contract change order will not affect contract time and no adjustment in contract time is provided for.

CONCURRED BY:		ESTIMATE OF COST		
CONSTRUCTION ENGINEER/BRIDGE ENGINEER	DATE	ITEMS	THIS REQUEST	TOTAL TO DATE
PROJECT ENGINEER	DATE	FORCE ACCOUNT		
		AGREED PRICE	$48,302.80	$48,302.80
PROJECT MANAGER	DATE	ADJUSTMENT		
		TOTAL	$48,302.80	$48,302.80
FHWA REP.	DATE	**FEDERAL PARTICIPATION**		
		☐ PARTICIPATING ☐ PARTICIPATING IN PART ☐ NONE		
ENVIRONMENTAL	DATE	☐ NONPARTICIPATING (Maintenance) ☐ NONPARTICIPATING		
OTHER (SPECIFY)	DATE	**FEDERAL SEGREGATION** (If more than one funding source or P.I.P. type)		
		☐ CCO FUNDED PER CONTRACT ☐ CCO FUNDED AS FOLLOWS		
	DATE	FEDERAL FUNDING SOURCE		PERCENT
HQ OR DISTRICT PRIOR APPROVAL BY	DATE			
RESIDENT ENGINEER SIGNATURE	DATE			

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 2

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
2				

TO Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate

Extra Work at Agreed Unit Price:

Furnish flaggers in accordance with Section 7-1.08, "Public Convenience," and Section, 7-1.09, "Public Safety," of the *Standard Specifications*. Furnishing flaggers will be paid for as specified in Section 12-2.02, "Flagging Costs," of the *Standard Specifications* and as follows:

The following agreed hourly prices are determined in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the *Standard Specifications* and represent the state's 50 percent share of flagging costs. The contractor must maintain a daily log of flagging labor by individual. The copy of the log and a signed extra work bill must be submitted to the resident engineer before the 15th day of each month for payment. These agreed prices are subject to revision due to any changes in prevailing wage rates or labor surcharge rates.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 2 **of** 2

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
2				

Flaggers (contractor's employees) 1000 hours straight time @ $21.41/hr = $ 21,410.00
Flaggers (contractor's employees) 200 hours overtime @ $28.71/hr = $ 5,742.00
Foreman and pickup truck (contractor's employee)
20 hours straight time @ $41.90/hr = $ 838.00
Foreman and pickup truck (contractor's employee)
20 hours overtime @ $52.75/hr = $ 1055.00
Flaggers (subcontractor's employees) 500 hours straight time @ $22.48/hr = $11,240.00
Flaggers (subcontractor's employees) 200 hours overtime @ $30.15/hr = $ 6,030.00
Foreman and pickup truck (subcontractor's employee)
20 hours straight time @ $44.00/hr = $ 880.00
Foreman and pickup truck (subcontractor's employee)
20 hours overtime @ $55.39/hr = $ 1,107.80

Estimate of extra work = $ 48,302.80

Estimated Cost: : ☐ Decrease ☒ Increase $ 48,302.80.00

By reason of this order, the time of completion will be adjusted as follows: **No Adjustment**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 1 of 1

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-KP FED NO.
FROM Resident Engineer	
CCO NO. 3 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 127,127.12
$ 23,000.00 ☒ INCR ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☒ NO
SUPPLEMENTAL FUNDS PROVIDED $	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This change order provides for

Settlement of Notice of Potential Claim No. 2 dated June 1, 2000.

This contract change order compensates the contractor for additional costs incurred in the construction of retaining wall No. 3. The contract plans showed an existing 36-inch drainage culvert to be 6 meters in back of the top of the retaining wall. It was found to be much closer. The contractor was required to install special shoring to protect the culvert and submitted Notice of Potential Claim No. 2 for reimbursement of the protective work. Records of the protective work were kept during construction of the retaining wall. The resident engineer determined that, due to the plan error, the contractor is entitled to be reimbursed for the cost of protecting the culvert.

The adjustment in compensation at agreed lump sum, provided for in the contract change order, is based on the force account cost of protecting the culvert. Records and calculations used to determine the adjustment in compensation are on file in the project records.

This change was discussed with the construction engineer and she agrees that the contractor should receive additional compensation for protecting the culvert.

There will be no time adjustment by reason of this contract change order since the work involved did not affect the controlling operation.

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

ITEMS	THIS REQUEST	TOTAL TO DATE
	$ 0.00	$ 0.00
FORCE ACCOUNT	$ 0.00	$ 0.00
AGREED PRICE	$ 0.00	$ 0.00
ADJUSTMENT	$ 23,000.00	$ 23,000.00
TOTAL	**$ 23,000.00**	**$ 23,000.00**

FEDERAL PARTICIPATION

☒ PARTICIPATING ☐ PARTICIPATING IN PART ☐ NONE

☐ NON-PARTICIPATING (Maintenance) ☐ NON-PARTICIPATING

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

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 1

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)

TO Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate

Adjustment in Compensation at Agreed Lump Sum:

Compensate the contractor for additional costs incurred in the construction of Retaining Wall 3.

The contractor will receive and agrees to accept the lump sum of $23,000.00 for this change. This contract change order resolves Notice of Potential Claim No. 2, dated June 1, 2000.

Adjustment in compensation = $23,000.00

Estimated Cost: : ☐ Decrease ☒ Increase $ 23,000.00

By reason of this order, the time of completion will be adjusted as follows: **No Adjustment**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 1 of 1

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-KP FED NO.
FROM Resident Engineer	
CCO NO. 4 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 127,127.12
$ 843.84 ☒ INCR ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☒ NO
SUPPLEMENTAL FUNDS PROVIDED $	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This change order provides for

Payment of interest for late payment of undisputed extra work bills.

The contractor submitted acceptable extra work bills in the amount of $40,000 on September 8, 2000, for work performed on Contract Change Order 2 and Contract Change Order 3. However, because of filing errors in the resident engineer's office, these bills were not paid within the time limits specified in Section 5-xx , "Interest on Payments," of the *Special Provisions*. The bills were paid on the estimate for the period ending December 20, 2000, and the check including payment for these bills was issued January 6, 2001.

The interest paid by this contract change order is calculated for the 77-day period beginning October 20, 2000, and ending January 5, 2001.

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

ITEMS	THIS REQUEST	TOTAL TO DATE
	$ 0.00	$ 0.00
FORCE ACCOUNT	$ 0.00	$ 0.00
AGREED PRICE	$ 0.00	$ 0.00
ADJUSTMENT	$ 843.84	$ 843.84
TOTAL	**$ 843.84**	**$ 843.84**

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

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 1

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
4				

TO Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate.

Adjustment in Compensation at Agreed Lump Sum:

In accordance with Section 5.xx , "Interest on Payments," of the *Special Provisions*, provide payment of interest for the following extra work bills:

CCO No. 2, Daily Extra Work Reports 28, 29, 30, and 32.
CCO No. 3, Daily Extra Work Report 1, 2, 5, 7, and 8.

Interest = $40,000 X (0.10/365) X 77 days = $843.84.

Total adjustment = $843.84.

Estimated Cost: : ☐ Decrease ☒ Increase $ 843.84

By reason of this order, the time of completion will be adjusted as follows: **No Adjustment**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 1 of 1

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-KP FED NO.
FROM Resident Engineer	
CCO NO. 5 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 127,127.12
$ 3,600.00 ☐ INCR ☒ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☒ NO
SUPPLEMENTAL FUNDS PROVIDED $	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This contract change order provides for

Eliminating the foliage protectors shown on the plant list, in the remarks column (Sheet HP-1).

The district landscape architect has determined that foliage protectors are not needed on this project. Attached is a letter from the district landscape architect requesting this change.
As required in Section 10-2.01A, Cost Breakdown," of the *Special Provisions*, the contractor submitted a cost breakdown for highway planting. The price for foliage protectors included in the cost breakdown submittal is $1.50 each. The contract change order provides for an adjustment in compensation, based on the submitted price and the special provision.

The deleted portion of the lump sum contract item, highway planting, is subject to Section 4-1.03B(3), "Eliminated Items," of the *Standard Specifications*. The contractor purchased no material and did no work on foliage protectors. Therefore, the contract change order provides that no adjustment in compensation is made in accordance with Section 4-1.03B(3).

CONCURRED BY:		ESTIMATE OF COST		
CONSTRUCTION ENGINEER/BRIDGE ENGINEER	DATE		THIS REQUEST	TOTAL TO DATE
		ITEMS	$ 0.00	$ 0.00
PROJECT ENGINEER	DATE	FORCE ACCOUNT	$ 0.00	$ 0.00
		AGREED PRICE	$ 0.00	$ 0.00
PROJECT MANAGER	DATE	ADJUSTMENT	($ 3,600.00)	($ 3,600.00)
		TOTAL	**($ 3,600.00)**	**($ 3,600.00)**
FHWA REP.	DATE	**FEDERAL PARTICIPATION**		
		☒ PARTICIPATING ☐ PARTICIPATING IN PART ☐ NONE		
ENVIRONMENTAL	DATE	☐ NONPARTICIPATING (Maintenance) ☐ NONPARTICIPATING		
OTHER (SPECIFY)	DATE	**FEDERAL SEGREGATION (If more than one funding source or P.I.P. type)**		
	DATE	☐ CCO FUNDED PER CONTRACT ☐ CCO FUNDED AS FOLLOWS		
HQ OR DISTRICT PRIOR APPROVAL BY	DATE	FEDERAL FUNDING SOURCE		PERCENT
RESIDENT ENGINEER SIGNATURE	DATE			

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 1

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
5				

TO

Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate

Delete foliage protectors shown under remarks on the plant list of Contract Plan Sheet HP-1 and shown on the highway planting cost breakdown submitted by the contractor in accordance with Section 10-2.01A, "Cost Breakdown," of the *Special Provisions*.

Adjustment in Compensation at Agreed Unit Price:

In accordance with Section 10-2.01A, "Cost Break-Down," of the *Special Provisions*, an adjustment in compensation (decrease) will be made to Contract Item 36 (Lump Sum), Highway Planting.

Item 36 – Highway Planting (Foliage Protector Unit)
Decrease 2400 EA Foliage Protectors (-100 %) @ $1.50 Ea……$3,600 (-6 %)

In accordance with Section 4-1.03B(3), "Eliminated Items," of the *Standard Specifications* and Section 10-2.01A, "Cost Break-down," of the *Special Provisions,* the adjustment due to eliminating foliage protectors is zero.

Estimated Cost: : ☒ Decrease ☐ Increase $ 3,600.00

By reason of this order, the time of completion will be adjusted as follows: **No Adjustment**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 1 of 1

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903) CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-KP FED NO.
FROM Resident Engineer	
CCO NO. 6 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 127,127.12
$ 922.32 ☒ INCR ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☒ YES ☐ NO
SUPPLEMENTAL FUNDS PROVIDED $	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This change order provides for

Furnishing 3.51 mm thick pipe in lieu of 2.77 mm thick pipe for the 1800 mm diameter corrugated metal pipe at station “N” 375+00.

The district materials engineer requested this change because of new information obtained regarding the abrasiveness of the streambed load at this location. The letter requesting the change is attached.

This change constitutes a change in character for the contract item for 1800 mm diameter corrugated metal pipe. A unit price adjustment of $25.62 per meter will be paid for the increased pipe thickness. The adjustment is based on price quotes for the two pipe sizes from the supplier. A 15 percent material markup was added to the difference in the two quotes to arrive at the unit adjustment. Records supporting this adjustment are on file in the project records.

No adjustment in contract time is warranted. This change does not affect contract time.

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

ESTIMATE OF COST

ITEMS	THIS REQUEST	TOTAL TO DATE
	$ 0.00	$ 0.00
FORCE ACCOUNT	$ 0.00	$ 0.00
AGREED PRICE	$ 0.00	$ 0.00
ADJUSTMENT	$ 922.32	$ 922.32
TOTAL	**$ 922.32**	**$ 922.32**

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

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 1

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
6				

TO

Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate

Adjustment in Compensation at Agreed Unit Price:

Furnish 3.51 mm thick pipe in lieu of the specified 2.77 mm thick pipe for the 1800 mm diameter corrugated metal pipe culvert at station “N” 375+00.

In accordance with Section 4-1.03C, “Changes in Character of Work,” of the *Standard Specifications*, a unit price adjustment of $25.62 per meter of 1800 mm diameter corrugated metal pipe will be paid for furnishing 3.51 mm thick pipe in lieu of 2.77 mm thick pipe. This adjustment constitutes full compensation, including all markups, for this change.

Estimated cost: 36 m @ $25.62 / m = $922.32

Estimated Cost: : ☐ Decrease ☒ Increase $ 922.32

By reason of this order, the time of completion will be adjusted as follows: **No Adjustment**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 1 of 2

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-KP FED NO.
FROM Resident Engineer	
CCO NO. 7 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 260,000.00
$ 404,210.00 ☒ INCR ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☒ YES ☐ NO
SUPPLEMENTAL FUNDS PROVIDED $	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This change order provides for

1. Adding an additional area of permeable blanket and underdrain system.
2. Furnishing Class 1 permeable material in lieu of the specified Class 3 permeable material.
3. Removing and replacing permeable material already placed.

The Class 3 permeable material specified in the *Special Provisions* did not function properly. The district materials engineer recommended that Class 1 permeable material be used instead for permeable blankets. Unanticipated ground water was encountered throughout the entire cut between Stations “A” 725 + 00 and “A” 737 + 00. The district materials engineer recommended that the planned permeable blanket and underdrain system between Stations “A” 722 + 50 and “A” 725 + 00 be extended to Station “A” 737 + 00. The district materials engineer’s letter, recommending these changes, is attached.

This contract change order increases quantities of Contract Item 6, “Roadway Excavation,” and Contract Item 48, “Permeable Material (Blanket).”

We have provided a change in character adjustment in compensation for the permeable material contract item. The adjustment, based on the contractor’s force account analysis and verified by the engineer, represents the increased cost in processing the permeable material. Calculations supporting the adjustment are on file with the project records.

Adjustment in compensation due to the overrun in Contract Item 48, “Permeable Material (Blanket),” is deferred until the completion of the item.

Removing and disposing of the Class 3 permeable material previously placed will be paid for as extra work at force account. There is no contract item that would be applicable to this work.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 2 of 2

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

The contractor requested an adjustment in contract time of an additional eight working days. Placing the additional permeable material will delay structural section work (the controlling item), and time will be required to begin producing the Class 1 permeable material. The engineer's analysis, on file with the contract records, verifies that an eight-day extension of contract time is reasonable.

CONCURRED BY:		ESTIMATE OF COST		
CONSTRUCTION ENGINEER/BRIDGE ENGINEER	DATE		THIS REQUEST	TOTAL TO DATE
		ITEMS	$ 268,810.00	$ 268,810.00
PROJECT ENGINEER	DATE	FORCE ACCOUNT	$ 17,000.00	$ 17,000.00
		AGREED PRICE	$ 0.00	$ 0.00
PROJECT MANAGER	DATE	ADJUSTMENT	$ 118,400.00	$ 118,400.00
		TOTAL	$ 404,210.00	$ 404,210.00
FHWA REP.	DATE	**FEDERAL PARTICIPATION**		
		☒ PARTICIPATING ☐ PARTICIPATING IN PART ☐ NONE		
ENVIRONMENTAL	DATE	☐ NONPARTICIPATING (Maintenance) ☐ NONPARTICIPATING		
OTHER (SPECIFY)	DATE	**FEDERAL SEGREGATION** (If more than one funding source or P.I.P. type)		
		☒ CCO FUNDED PER CONTRACT ☐ CCO FUNDED AS FOLLOWS		
	DATE	FEDERAL FUNDING SOURCE		PERCENT
HQ OR DISTRICT PRIOR APPROVAL BY	DATE			
RESIDENT ENGINEER SIGNATURE	DATE			

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** _____

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
7				

TO Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate.

As shown on sheets 3 and 4 of this contract change order, place a permeable blanket and underdrain system between stations "A" 725 + 00 and "A" 737 + 00. Place permeable material (blanket) between station "A" 722 + 50 and "A" 725 + 00.

Estimate of Increases in Contract Items at Contract Unit Prices:

Item 6 roadway excavation	5,000 m^3 (1 %) @ \$1.25/ m^3 =	\$ 6,250.00 (+ 8 %)
Item 48 permeable material (blanket)	17,760 tonnes (27 %) @ \$6.00	\$ 106,560.00(+27%)
Item 46 200 mm perforated plastic pipe underdrain	2,600 m (23 %) @ \$60.00	\$ 156,000.00 (+23%)
Estimated increase		\$ 268,810.00

Any adjustment due in accordance with Section 4-1.03B(1), "Increases of More Than 25 Percent," of the *Standard Specifications*, for Contract Item 48 is deferred.

Adjustment in Compensation at Agreed Price:

In lieu of Class 3 permeable material, as specified in the *Special Provisions*, use Class 1 permeable material for all permeable blankets. In accordance with Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications*, the contractor will accept and receive \$1.48 per tonne of permeable material (blanket). This sum constitutes full payment, including all markups, for this change.

Estimated adjustment 80,000 tonnes @ \$1.48 \$ 118,400.00

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 2 **of** _____

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
7				

Extra Work at Force Account:

Remove the Class 3 permeable material (blanket) from the roadbed between station "A" 722 + 50 and "A" 725 + 00 and place it in the embankment at station "A" 715 + 00.

Estimate of extra work $ 17,000.00

Estimated Cost: : ☐ Decrease ☒ Increase $ 404,210.00

By reason of this order, the time of completion will be adjusted as follows: **8 Working Days Extension**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 1 of 2

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-KP FED NO.
FROM Resident Engineer	
CCO NO. 8 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 68,500.00
$ 9,203.00 ☒ INCR ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☒ NO
SUPPLEMENTAL FUNDS PROVIDED $	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This change order provides for

Compensating the contractor for a right-of-way delay.

A 300 mm waterline, crossing the right-of-way at station “A” 453 + 45 was lowered and placed in a steel conduit before construction began on the project. During roadway excavation operations, a check was made on the elevation of the waterline, and it was discovered that an error of approximately 2 meters had been made in establishing the relocated elevation. The line was critical for water service in the area and could be taken out of service for only short time periods. Roadway excavation had to be suspended from September 29, 2000, through October 12, 2000, while city water crews lowered the line below planned subgrade.

Some of the roadway excavation equipment was sent to other work, and the remainder of the equipment that was made idle by the delay remained at the job site. The adjustment in compensation provided for in the contract change order represents the cost of idle equipment calculated as specified in Section 8-1.09, “Right of Way Delays,” of the *Standard Specifications.* Records were kept of equipment moved off the site to other work and moved back in when roadway excavation resumed. Cost of move-out and move-in are paid for as extra work at agreed price. The contract change order does not include payments for the idle time of workers. A full day of work was completed on September 28,’ 2000, before the work was suspended.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 2 of 2

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

Records and cost calculations for the adjustment in compensation and for the extra work at agreed price are on file with the project records.

The contract change order provides for an increase in contract time of 10 working days. Earthwork was the controlling operation, and it was delayed for the period between September 29, 2000, and October 12, 2000, inclusive.

CONCURRED BY:		ESTIMATE OF COST		
CONSTRUCTION ENGINEER/BRIDGE ENGINEER	DATE	ITEMS	THIS REQUEST	TOTAL TO DATE
			$ 0.00	$ 0.00
PROJECT ENGINEER	DATE	FORCE ACCOUNT	$ 0.00	$ 0.00
		AGREED PRICE	$ 2,350.00	$ 2,350.00
PROJECT MANAGER	DATE	ADJUSTMENT	$ 6,853.00	$ 6,853.00
		TOTAL	**$ 9,203.00**	**$ 9,203.00**
FHWA REP.	DATE	**FEDERAL PARTICIPATION**		
		☒ PARTICIPATING ☐ PARTICIPATING IN PART ☐ NONE		
ENVIRONMENTAL	DATE	☐ NONPARTICIPATING (Maintenance) ☐ NONPARTICIPATING		
OTHER (SPECIFY)	DATE	**FEDERAL SEGREGATION (If more than one funding source or P.I.P. type)**		
		☐ CCO FUNDED PER CONTRACT ☐ CCO FUNDED AS FOLLOWS		
	DATE	FEDERAL FUNDING SOURCE		PERCENT
HQ OR DISTRICT PRIOR APPROVAL BY	DATE			
RESIDENT ENGINEER SIGNATURE	DATE			

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 1

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
8				

TO Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate.

Adjustment in Compensation at Agreed Lump Sum:

In accordance with Section 8-1.09, "Right of Way Delay," of the *Standard Specifications*, the contractor agrees to accept the sum of $6,853.00 as full compensation for idle equipment due to suspension of roadway excavation from September 29, 2000, through October 12, 2000.

Adjustment of compensation…… $ 6,853.00 increase

Extra Work at Agreed Price

The contractor agrees to accept and receive the sum of $2,350.00 as full compensation for the extra cost of moving equipment made necessary by the suspension of roadway excavation from September 29, 2000, through October 12, 2000.

Extra work……. $ 2,350.00 increase

A determination of the delay in completion of the contract due to the right-of-way delay caused by the suspension of the earthwork from September 29, 2000, through October 12, 2000, has been made in accordance with the provisions of Section 8-1.07, "Liquidated Damages," of the *Standard Specifications*.

The contractor shall be granted 10 working days for the following dates: August 29, 2000, through September 12, 2000.

Estimated Cost: : ☐ Decrease ☒ Increase $ 9,203.00

By reason of this order, the time of completion will be adjusted as follows: **10 Working Days**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 1 of 2

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-KP FED NO.
FROM Resident engineer	
CCO NO. 9 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 75,000.00
$ 2,945.30 ☐ INCR ☒ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☒ NO
SUPPLEMENTAL FUNDS PROVIDED $	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This change order provides for

A cost reduction incentive to eliminate the falsework opening at the Brighton Overhead (Br. No. 24-289 R/L).

The contractor negotiated an agreement with Ms. Mary Smith, owner of the property served by the driveway passing under the Brighton Overhead. A copy of the agreement is attached. As a result of the agreement, the temporary falsework opening at the Brighton Overhead can be eliminated. The contractor submitted a cost reduction incentive proposal providing for elimination of the opening. The Division of Structure Construction has approved revised falsework plans.

The estimated net savings in construction costs resulting from this contract change order are $5,890.60. The net decrease is based on the following:

1. A decrease in Contract Item 3, “Temporary Railing (Type K),” at the contract price of $4,312.00. A cost analysis, on file with the project records, verifies that the contract price of this item is reasonably close to the actual cost of the work determined by the force account method.
2. A decrease in the cost of constructing the Brighton Overhead falsework of $1578.60. This decrease is based on the contractor’s submitted force account analysis verified by the engineer. Cost information and analysis are on file with the project records.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 2 of 2

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

On half of the construction cost savings, $2,945.30 is returned to the contractor as an adjustment in compensation in accordance with the cost reduction incentive specification.

This change had no effect on contract time, and no adjustment in contract time is made in the contract change order.

CONCURRED BY:		ESTIMATE OF COST		
CONSTRUCTION ENGINEER/BRIDGE ENGINEER	DATE	ITEMS	THIS REQUEST	TOTAL TO DATE
			($ 4,312.00)	($ 4,312.00)
PROJECT ENGINEER	DATE	FORCE ACCOUNT	$ 0.00	$ 0.00
		AGREED PRICE	$ 0.00	$ 0.00
PROJECT MANAGER	DATE	ADJUSTMENT	$ 1,366.70	$ 1,366.70
		TOTAL	($ 2,945.30)	($ 2,945.30)
FHWA REP.	DATE	**FEDERAL PARTICIPATION**		
		☒ PARTICIPATING	☐ PARTICIPATING IN PART	☐ NONE
ENVIRONMENTAL	DATE	☐ NONPARTICIPATING (Maintenance)	☐ NONPARTICIPATING	
OTHER (SPECIFY)	DATE	**FEDERAL SEGREGATION** (If more than one funding source or P.I.P. type)		
		☐ CCO FUNDED PER CONTRACT	☐ CCO FUNDED AS FOLLOWS	
	DATE	FEDERAL FUNDING SOURCE	PERCENT	
HQ OR DISTRICT PRIOR APPROVAL BY	DATE			
RESIDENT ENGINEER SIGNATURE	DATE			

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 1

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☐ Engineer ☒ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
9				

TO

Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate.

In accordance with Section 5-1.14, "Cost Reduction Incentive," of the *Standard Specifications*, eliminate the falsework opening at the Brighton Overhead (Br. No. 24-289 R/L).

Decrease Contract Item at Contract Item Price:

Item No. 3, "Temporary Railing (Type K)," 392 m (7 %) @ $11.00/m = $ 4,312.00 (-7 %)

Adjustment in Compensation:

In accordance with Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications,"* the state will receive a credit of $1,578.60 by eliminating the falsework opening at the Brighton Overhead.

Adjustment in compensation (decrease) = $ 1,578.60

Adjustment in Compensation

In accordance with Section 5-1.14, "Cost Reduction Incentive," of the *Standard Specifications*, the contractor agrees to accept the above decrease in contract payments and a lump sum payment of $2,945.30 as full compensation for this change.

Adjustment in compensation (increase) = $ 2,945.30

Estimated Cost: : ☒ Decrease ☐ Increase $2,945.30

By reason of this order, the time of completion will be adjusted as follows: **No Adjustment**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 1 of 1

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-KP FED NO.
FROM Resident Engineer	
CCO NO. 10 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 269,000.00
$ $43,807.10 ☒ INCR ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☒ NO
SUPPLEMENTAL FUNDS PROVIDED $	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This contract change order provides for

Constructing a reinforced concrete box culvert at Station 782 + 32, to serve as a cattle pass.

Before the project was advertised, the district right-of-way agents were unable to close negotiations with the abutting property owner adjacent to Station 782 + 32. An Order of Immediate Possession was obtained so that construction could begin. Before the start of construction, negotiations were finally closed. The major item of agreement was the construction of a 2440 mm x 2440 mm reinforced concrete box culvert, located at Station 782 + 32, to serve as a cattle pass from one portion of the property to the other. There are no applicable contract items for constructing the reinforced concrete box culvert. The contractor quoted a price of $216.00 per cubic meter of concrete, in-place, for the reinforced concrete box culvert. The resident engineer verified this cost as reasonable by performing an independent force account analysis. The cost submittal and independent analysis are filed in the job records. Structure excavation and structure backfill will be measured and paid for by contract item.

The project engineer and the construction engineer agreed with this change.

Construction of the reinforced concrete box culvert will not affect contract time. No adjustment of contract time is provided for in the contract change order.

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

ITEMS	THIS REQUEST	TOTAL TO DATE
	$ 6,655.10	$ 6,655.10
FORCE ACCOUNT	$ 0.00	$ 0.00
AGREED PRICE	$ 37,152.00	$ 37,152.00
ADJUSTMENT	$ 0.00	$ 0.00
TOTAL	**$ 43,807.10**	**$ 43,807.10**

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

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 2

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
10				

TO

Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate.

Increases in Contract Items at Contract Prices:

Perform excavation and backfill for the reinforced concrete box culvert shown on sheet 3 of 3 of this contract change order.

Item No. 43 (F) – Structure Excavation
220 m^3 (7 %) @ \$8.83/ m^3 = \$ 1,942.60 (+18 %)
Item No. 44 (F) – Structure Backfill
250 m^3 (3%) @ \$18.85/ m^3 = ... \$ 4,712.50 (+11 %)

Total increase in contract items =\$ 6,655.10

The quantity increase shown here for Contract Items 43 and Contract Item 44, when combined with quantities shown in the engineer's estimate, and as modified by any previous change orders or revisions to dimensions made by the engineer, will be the final quantities for which payment will be made for each contract item.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 2

CONTRACT CHANGE ORDER

CEM-4900 CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

Extra Work at Agreed Unit Price:

Construct a reinforced concrete box culvert at station 782 + 32 as shown on sheet 3 of 3 of this contract change order and *Standard Plans* D80, D82, and D83. Perform all work in accordance with Section 51, "Concrete Structures," and Section 52, "Reinforcement," of the *Standard Specifications*.

A payment of $216.00 per cubic meter of concrete, measured in accordance with the *Standard Specifications*, will constitute full compensation, including all markups, for constructing the reinforced concrete box culvert, complete in-place, including all reinforcing steel and incidentals.

Estimate of extra work = 172 M3 @ $216.00 = $37,152.00 increase

Estimated Cost: : ☐ Decrease ☒ Increase $ 43,807.10

By reason of this order, the time of completion will be adjusted as follows: **No adjustment**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

Example 5-3.11 Adjustment for Asphalt Price Fluctation (Adjustment in Compensation)

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Page 1 of 1

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 CT# 7541-3544-0

DATE

TO	FILE E. A. CO-RTE-KP FED NO.
FROM Resident Engineer	
CCO NO. 11 / SUPPLEMENT NO. / CATEGORY CODE	CONTINGENCY BALANCE (including this change): $ 115,000.00
$ 120,000.00 ☒ INCR ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☒ NO
SUPPLEMENTAL FUNDS PROVIDED $ 120,000.00 for price index fluctuations.	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☒ YES ☐ NO

This change order provides for

Adjustments of compensation for fluctuations in the California Statewide Paving Asphalt Price Index.

This change is made in accordance with the requirements of Section 5-xx, "Compensation Adjustment for Price Index Fluctuations," of the *Special Provisions*. Contract Item 20, "Asphalt Concrete," and Contract Item 22, "Asphalt Concrete Base," are subject to the adjustment. The contract change order authorizes the maximum amount allowed by the special provision.

CONCURRED BY:		ESTIMATE OF COST		
CONSTRUCTION ENGINEER/BRIDGE ENGINEER	DATE		THIS REQUEST	TOTAL TO DATE
		ITEMS	$ 0.00	$ 0.00
PROJECT ENGINEER	DATE	FORCE ACCOUNT	$ 0.00	$ 0.00
		AGREED PRICE	$ 0.00	$ 0.00
PROJECT MANAGER	DATE	ADJUSTMENT	$ 120,000.00	$ 120,000.00
		TOTAL	**$ 120,000.00**	**$ 120,000.00**
FHWA REP.	DATE	**FEDERAL PARTICIPATION**		
		☒ PARTICIPATING	☐ PARTICIPATING IN PART	☐ NONE
ENVIRONMENTAL	DATE	☐ NONPARTICIPATING (Maintenance)	☐ NONPARTICIPATING	
OTHER (SPECIFY)	DATE	**FEDERAL SEGREGATION** (If more than one funding source or P.I.P. type)		
		☐ CCO FUNDED PER CONTRACT	☐ CCO FUNDED AS FOLLOWS	
	DATE	FEDERAL FUNDING SOURCE	PERCENT	
HQ OR DISTRICT PRIOR APPROVAL BY	DATE			
RESIDENT ENGINEER SIGNATURE	DATE			

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION **Sheet** 1 **of** 1

CONTRACT CHANGE ORDER

CEM-4900 (OLD HC-5 REV. 9/97) CT# 7541-3501-0 Change Requested by: ☒ Engineer ☐ Contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NO.	ROAD	FEDERAL NUMBER(S)
11				

TO

Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities, and prices to be paid. (Segregate between additional work at contract price, agreed price, and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate.

Adjustment in Compensation at Unit Price:

Adjust the contract unit prices of the contract items listed below in accordance with Section 5.1xx, "Compensation Adjustments for Price Index Fluctuations," of the *Special Provisions*.

Item 20, Asphalt Concrete
Item 22, Asphalt Concrete Base

Estimated cost increase = $ 120,000.00

Estimated Cost: : ☐ Decrease ☒ Increase $ 120,000.00

By reason of this order, the time of completion will be adjusted as follows: **No Adjustment**

SUBMITTED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
APPROVAL RECOMMENDED BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE
ENGINEER APPROVAL BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

We, the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment, therefore, the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY		
SIGNATURE	(PRINT NAME & TITLE)	DATE

Section 4 Disputes

5-401 General

5-402 Types of Disputes
5-402A Notice
5-402B Protest
5-402C Potential Claim
5-402D Claim

5-403 Response to Disputes

5-404 Claims Resolution Process
5-404A Issue Proposed Final Estimate--Target Day 45
5-404B Proposed Final Estimate Returned--Target Day 75
5-404C Begin Claim Review--Target Day 80
5-404D Field Review of Claims--Target Day 105
5-404E District Claim Meeting--Target Day 115
5-404F District Construction Position--Target Day 135
5-404G Board of Review Meeting--Target Day 180
5-404G (1) Board of Review Secretary
5-404G (2) Board of Review Member Selection
5-404G (3) Board of Review Operation
5-404G (4) Board of Review Not Attended
5-404G (5) Board of Review Settlements
5-404H Final Determination of Claims--Target Day 240

5-405 Claim Payments
5-405A Claim Payments Based on Entitlement
5-405B Claim Payments Based on Negotiated Settlements

5-406 Overhead Claims
5-406A Home Office Overhead
5-406B Field Office Overhead
5-406C Contractor Submitted Audits
5-406D Overhead Payments
5-406D (1) Home Office Overhead
5-406D (2) Field Office Overhead

5-407 Audits

5-407A Audit Request Procedure
5-407B Final Audit Report
5-407C Unallowable Expenses

5-408 Arbitration

5-409 Construction Claim Report Guidelines

5-409A Format
5-409B Content
5-409B (1) Title Page
5-409B (2) Table of Contents (with page numbers)
5-409B (3) Project Chronology
5-409B (4) General Information
5-409B (5) Summary of Resolved Claims (if applicable)
5-409B (6) Summary of Unresolved Claims
5-409B (7) Claim Number, Title, Claim Amount
5-409B (8) Background
5-409B (9) Contractor's Position
5-409B (10) District's Position
5-409B (11) Conclusion
5-409B (12) Exhibits
5-409C Suggestions
5-409C (1) Helpful Hints
5-409C (2) Things To Avoid

5-410 Board of Review Report and Determination Guidelines

5-410A Format
5-410B Content of Board of Review Report
5-410B (1) Introduction
5-410B (2) Comments of the Board
5-410B (3) Conclusions of the Board
5-410C Content of Board of Review Determination

Table 5-4.1 Delegation of Authority

Table 5-4.2 Audit Process

Example 5-4.1 Sample Dispute Response Clauses

5-410D Notice
- *5-410D (1) General*
- *5-410D (2) If no merit*
- *5-410D (3) If merit*

5-410E Protest
- *5-410E (1) Contract Change Order Time Adjustment*
  - 5-410E (1a) General
  - 5-410E (1b) If no merit
  - 5-410E (1c) If merit
- *5-410E (2) Weekly Statement of Working Days*
  - 5-410E (2a) General
  - 5-410E (2b) If no merit
  - 5-410E (2c) If merit

5-410F Notice of Potential Claim
- *5-410F (1) General*
- *5-410F (2) If no merit*
- *5-410F (3) If merit*

5-410G Request for Information

Example 5-4.2 Sample Construction Claim Report

Example 5-4.3 Sample Claim Position Letter

Example 5-4.4 Sample Final Estimate Letter--No Board of Review Attended

Example 5-4.5 Sample Final Estimate Letter--Board of Review Attended

Example 5-4.6 Attachment to Audit Request

Section 4 Disputes

Section 4
Disputes

5-401 General

5-401
General

A contract dispute is a disagreement between the contractor and Caltrans over the need to revise the contract or an interpretation of the contract. Disputes take the form of a notice, a protest, a potential claim, or claim. Upon receiving notice of a dispute, the resident engineer must address and resolve disputes in a timely manner.

This section is designed to assist the resident engineer, construction engineer, and other district personnel in handling disputes. We have included procedures and options for resolving disputes, both during contract work and after contract acceptance. Other inclusions consist of a claim process timeline, claim report formatting, documentation procedures, and the responsibilities of district and Division of Construction personnel throughout the dispute resolution process. Our objective is to ensure the correct and timely handling of contract disputes.

Resolving a dispute involves understanding the disputed issue, ascertaining the relevant facts, determining responsibilities, and compensating the contractor if reasons exist for doing so or refusing compensation with clear reasons when no merit exists.

So that the resident engineer can fully analyze disputes, contractors are contractually obligated to provide all the required documentation. If the contractor fails to provide a clear understanding of the issue, along with supporting documentation and calculations, the resident engineer will find it difficult, if not impossible, to determine the merits of a dispute.

On some projects, formal partnering and a dispute review board are available to the resident engineer and contractor to assist in resolving disputes. If a dispute remains unresolved after contract acceptance, the dispute will be handled through the after-acceptance claims resolution process and, potentially, arbitration.

To account for dispute and claim resolution activities on your timesheet, use Activity Code 1290 (federal aid) or Activity Code 2290 (non-federal aid). For more information on these activity codes, refer to Chapter 6, “Activity Codes,” of the *Coding Manual*.

5-402 Types of Disputes

5-402
Types of Disputes

Disputes may be divided into four general categories: notices, protests, potential claims, and claims. The *Standard Specifications* and special provisions discuss in detail all four types of disputes.

During the life of the project and up to receiving the proposed final estimate, the contractor must bring any disputes to the resident engineer’s attention in the form of a written notice, protest, or a potential claim. Disputes become claims when the contractor lists them as exceptions to the proposed final estimate.

5-402A Notice

A "Notice" applies to unforeseen conditions encountered on the project that were not shown in the plans or detailed in the specifications. Notices are typically required with unforeseen conditions described in Section 5-1.116, "Differing Site Conditions," Section 8-1.07, "Liquidated Damages," and Section 8-1.10, "Utility and Non-Highway Facilities," of the *Standard Specifications*.

5-402B Protest

"Protest" applies to a dispute about the terms or conditions of a contract change order or about the contract time determined on Form CEM-2701, "Weekly Statement of Working Days." For how to protest a contract change order, see Section 4-1.03A, "Procedure and Protest," of the *Standard Specifications*. For how to protest the failure of the engineer to recognize a change in character, see Section 4-1.03C, "Changes in Character of Work," of the *Standard Specifications*. For how to protest contract time, see Section 8-1.06, "Time of Completion," of the *Standard Specifications*. For more information on protests, also refer to Section 3-403A, "Procedure and Protest," Section 3-511, "Differing Site Conditions," and Section 3-805, "Time of Completion," of the *Construction Manual* (manual).

5-402C Potential Claim

"Potential claim" applies to a dispute between the contractor and Caltrans regarding issues for which the contractor believes additional compensation is due. For the conditions the contractor must satisfy to pursue a potential claim, see Section 9-1.04, "Notice of Potential Claim," of the *Standard Specifications*.

5-402D Claim

"Claim" refers to disputes (notices, protests, or potential claims) developed during the contract that the contractor lists as exceptions to the proposed final estimate.

5-403 Response to Disputes

5-403 Response to Disputes

The resident engineer must determine if the contractor's dispute has merit. If the dispute does have merit, the resident engineer must take appropriate actions within the scope of the contract and within the resident engineer's authority to resolve the dispute. If the resident engineer cannot resolve the dispute or lacks the authority to act, the resident engineer should discuss the issue with the construction engineer and the structure construction engineer, if appropriate.

When receiving from the contractor a written notice of dispute (notice, protest, or notice of potential claim), note on the written notice of dispute the date and time of receipt and the name of the person receiving the written notice. Ensure the notice of dispute is complete and timely. If the information is not complete, the resident engineer must notify the contractor of the deficiencies and request the notice be resubmitted. (See Example 5-4.1, "Sample Dispute Response Clauses," later in this section.)

If the contractor failed to submit the notice, protest, or notice of potential claim within the specified time, notify the contractor of this fact and state that Caltrans will not consider the notice. Section 9-1.04, "Notice of Potential Claim," of the *Standard Specifications*, requires that a notice of potential claim be submitted on Form CEM 6201, "Notice of Potential Claim," and certified with reference to the False Claims Act, Government Code Section 12650 - 12655. The form contains language referring to the certification. By signing the form the contractor fulfills the certification requirements. If a notice of potential claim is received without certification, notify the contractor that it was not submitted in accordance with Section 9-1.04, "Notice of Potential Claim," of the *Standard Specifications* and that 15 days will be allowed to certify or withdraw the potential claim. Should certification not

be provided in the required time, notify the contractor in writing that Caltrans will not consider the notice of potential claim. Discuss this latter notification with the construction engineer.

Once a complete notice of dispute has been received and evaluated, send a response letter to the contractor. The response letter should include three basic sections: the dispute background, the contractor's position, and the resident engineer's position.

The background should explain the circumstances that led to the dispute. Include factual information such as events, dates, discussions, meetings, memos, and letters.

The contractor's position is based on supplied information. Use direct quotes from the information the contractor provided. Do not modify the contractor's information by attempting to interpret or clarify it.

The resident engineer's position must be clear and concise as to the merits of the dispute, using contract specifications to support the findings.

The response letter must also request the contractor to state if the contractor agrees or disagrees with the resident engineer's position on the dispute. Request the contractor to clarify those areas where disagreement exists.

When properly prepared as suggested above, the response letter will serve as the basis for the claim position letter and construction claim report should the dispute become a claim.

The following are guidelines for keeping proper records and providing adequate information when responding to notices, protests, and notices of potential claim:

- Ensure factual and accurate reports and documents. Use specific statements in daily reports. An entry such as "Told the contractor that . . ." is not satisfactory, whereas "I told Foreman Smith that..." is satisfactory. A general conclusion as to the effect of a conversation is not helpful; a statement of the conversation is better.
- Answer in writing all letters in which the contractor makes a questionable or erroneous statement, and deny or correct the statement. A written response is particularly important when the contractor appears to have written the letter to form the basis for a claim.
- Do not hesitate to put orders and decisions in writing. Confirm in writing any important statement about the unacceptability of the work. Before ordering the contractor to proceed with extra or additional work, the resident engineer must obtain approval. Again, to avoid potential difficulties, verify such orders in writing. If the contractor verbally informs the resident engineer of a dispute, advise the contractor to comply with the applicable requirement in the *Standard Specifications*. Include this verbal discussion in the resident engineer's daily report.
- On projects with dispute review boards, you can use the response to the contractor's notice of potential claim for the resident engineer's position paper.
- Focus on costs specific to the dispute, but do not discuss any funding availability (the project's contingency balance) with the contractor.
- If a dispute arises during the work's progress, keep accurate records of the operations to eliminate subsequent arguments related to work costs. During the progress of the disputed work, make regular tentative agreements for the labor, equipment, or material quantities.

- Photographs and videos are frequently of great value in establishing job conditions at a particular point in time. Always take preconstruction and project progress photographs. Remember that dated pictures of areas where work is not underway may be as important as the more spectacular pictures of construction operation or completed work. Be thorough in documenting the project's progress.
- Record the full names of all the contractor's personnel involved in any dispute. You may need to locate these people at a later date (address information is in the certified payrolls).
- To help determine and confirm costs associated with claims, take accurate equipment information such as description, model number, contractor's equipment number, size, and capacity.
- Category 62, "Disputes," of the project records must contain copies of all documents related to every dispute on the project. To provide a good basis for documenting claims, follow the procedures outlined in Section 5-1, "Project Records and Reports," of this manual.
- Progress schedules, prepared by the contractor or resident engineer, are very important. Require the contractor to submit, update, and revise, if necessary, the schedule in a timely manner.

5-404 Claims Resolution Process

5-404 Claims Resolution Process

After acceptance of the contract, all payments are made in accordance with Section 9-1.07, "Payment After Acceptance," of the *Standard Specifications*. For the handling of these payments, refer to Section 3-910, "Payment After Acceptance," of this manual.

Established milestones ensure the claims process is completed within 240 days after contract acceptance. In the remainder of this section, we refer to these milestones as "Target Day xx." When we refer to the number of days, we mean the number of calendar days elapsed after contract acceptance. For each completed contract, the district must determine milestone dates and monitor the progress of the claims resolution process.

<u>5-404A Issue Proposed Final Estimate—Target Day 45</u>
The district must issue a proposed final estimate within 45 days after contract acceptance and must not postpone the issuance while awaiting additional information from the contractor. Such delays might later be attributed to Caltrans. To prevent any delay in meeting the target date, complete all quantity calculations and adjustments during this period.

<u>5-404B Proposed Final Estimate Returned—Target Day 75</u>
The contractor has 30 days after receiving the proposed final estimate package to review, sign, and return it, either with or without a written statement of claims.

If the contractor returns the proposed final estimate indicating acceptance or the contractor does not return the proposed final estimate within the required 30 days, no further actions are required other than to process the final estimate. If claims are submitted after the 30-day limit, return the entire submittal to the contractor with a cover letter stating that Caltrans will not address the claims because they were not submitted in accordance with the contract.

If the contractor returns the proposed final estimate with a written statement of claims within the 30-day limit, the district construction office must send a copy of the contractor's claim package to the resident engineer, construction engineer, and district construction claims engineer.

5-404C Begin Claim Review—Target Day 80

By day 80, or after receipt of the contractors written statement of claims, the resident engineer must begin reviewing the claim package and may renew discussions with the contractor. Check the claim package for conformance with the requirements of Section 9-1.07B, "Final Payment and Claims," of the *Standard Specifications*. Ensure that each claim is the subject of a properly submitted notice, protest, or notice of potential claim, if appropriate. After the contractor has submitted the written statement of claims, no additional clarifying information is allowed unless the resident engineer requests it in writing. Only once during the entire claims resolution process can Caltrans request clarifying information for the contractor's claims. This one-time request must encompass all questions regarding the contractor's entire claims package. Place a time limit (typically 15 days) in which to respond. Failure on the part of the contractor to respond with the requested clarifying information constitutes sufficient reason for denying the claim. The resident engineer's request must be sent by certified mail with return receipt requested.

The nature of the claim will determine the ease with which it can be resolved. Administrative claims are typically straightforward and relatively easy to resolve. Administrative claims include claims for the following:

- Quantity disputes
- Administrative deductions for missing documents
- Adjustments in compensation for overruns and underruns of items
- Interest on late payments made on progress payments or properly submitted daily extra work bills
- Resolution of disputed labor, equipment, and materials as billed on daily extra work reports

If administrative claims have merit, payment may be made through item payments, contract change orders, or by releasing deductions. Accompany payment of these types of claims with a letter stating that the payment resolves the respective claim entirely. If the contractor does not accept the payment as full resolution, refer to Section 5-405, "Claim Payments," later in this section.

Contractual claims generally deal with questions of contract interpretation and may be more complex. Contractual claims may include issues about differing site conditions, liquidated damages, delays, impacts, or inefficiencies. Claims for field and home office overhead and cost escalation associated with delays caused by Caltrans must be supported with an audit by an independent certified public accountant (CPA). The Division of Accounting Services, Office of Audits and Investigations, will review the audit. For additional details, refer to Section 5-406, "Overhead Claims" later in this section.

If contractual claims have merit, prepare a contract change order providing for the compensation determined as due. The contract change order must contain language stating that the payment provides full resolution of the claim specified.

If the contractor is granted additional working days (with proper approval) beyond those shown on the proposed final estimate, add these days to the estimate request for any semifinal estimate. For information on time extensions, refer to Section 3-8, "Prosecution and Progress," of this manual.

5-404D Field Review of Claims—Target Day 105

The resident engineer and construction engineer are primarily responsible for completing the field review, which they must complete within 105 days of contract acceptance. Involvement of the district construction deputy director or construction manager will depend on the nature and complexity of the claims.

The resident engineer and construction engineer must meet with the contractor to clarify and understand the claims and to attempt resolution. The two engineers must make a concerted effort to resolve all administrative claims at this level and to resolve all contractual claims to whatever extent possible. Limit resolution to the determination of merit allowed by the contract.

Do not delay the claims resolution process because the contractor fails to supply information necessary to evaluate a claim. To allow sufficient time to complete subsequent activities in the total of 240 days, complete the field-level evaluation of claims within the 105-day target.

The resident engineer must diligently pursue the required administrative procedures whether or not the contractor is willing to supply information in a timely manner.

During the field review, the resident engineer and construction engineer may believe that some or all of the claims have no merit. If so, the two engineers must then meet with the construction manager or district construction deputy director to discuss the disputed claims. If the construction manager or district construction deputy director concur, notify the contractor in writing of this decision. The contractor may disagree and ask for a district claim meeting.

5-404E District Claim Meeting—Target Day 115

If the contractor requests a district claim meeting or if the district construction deputy director determines such a meeting would be beneficial, hold a district claim meeting at this time.

This meeting should be informal and facilitated by the construction manager or district construction deputy director. Once you have determined a time and date, send a letter of confirmation to the contractor.

The resident engineer and construction engineer must complete a draft construction claim report no later than one week before a district claim meeting. Clearly label these reports as drafts. For examples of how to write these reports, see Example 5-4.2, "Sample Construction Claim Report," near the end of this section. To allow sufficient review and discussion of the claims, give the construction manager, the district construction deputy director, the district construction claims unit, and the construction field coordinator an electronic copy and hardcopy of the draft construction claim report.

Coordinate any subsequent editing of the draft construction claim report through the district construction claims unit. Distribute the final draft construction claim report to all those Caltrans personnel who will attend the district claim meeting.

During the district claim meeting, do not accept any additional unsolicited claim information from the contractor.

After the district claim meeting, the district construction deputy director will decide the claim's merit. If the contractor makes pertinent statements at the district claim meeting, include these statements in the construction claim report, beginning with the statement "At the district claim meeting, the contractor stated that . . ."

If the construction manager or the district construction deputy director make the one-time request for additional clarifying claim information at the district claim meeting, include the district's position on the new information in a revised draft of the construction claim report.

The construction engineer, district construction claims engineer, construction manager, and district construction deputy director must all review the revised draft of the construction claim report. For additional review and comments, also send a copy of the revised draft to the construction field coordinator and contract reviewer. After considering all the comments, the district claims unit produces the final version of the construction claim report and distributes it to the district construction deputy director, construction field coordinator, and others for information or filing, as appropriate.

Once the district construction deputy director approves the construction claim report, all drafts (paper or electronic) must be destroyed. At this point in time, do not accept any additional information regarding claims from the contractor.

5-404F District Construction Position—Target Day 135

The district construction deputy director will document the district's position in a claim position letter to the contractor and must send it as a cover letter with the construction claim report. (See Example 5-4.3, "Sample Claim Position Letter," at the end of this section.) Before transmitting the claim position letter and construction claim report to the contractor, the construction division chief must obtain agreement from the construction field coordinator.

For each claim not resolved, the claim position letter must state that no contractual basis exists for the claim.

In issuing the claim position letter, the district construction deputy director is acknowledging that Caltrans has used all possible means of resolution in the claims resolution process. The claim position letter must also state that the contractor may request, in writing within 15 days, a board of review. Generally, the claim position letter should be no longer than one page.

5-404G Board of Review Meeting—Target Day 180

The target date to hold a board of review meeting, a required administrative procedure, is 180 calendar days from contract acceptance. The board of review is an informal meeting allowing the contractor the opportunity to verbally present all unresolved claims. The board of review always convenes when the contractor sends a notification of disagreement with the claim position letter. The board of review must listen to the contractor's presentation and provide timely and fair recommendations to the district director that comply with departmental and contractual requirements.

District and structure personnel involved with the project must attend the board of review meeting. For questions after the meeting is completed regarding complex claims or for first-hand knowledge of events, arrange to have other personnel involved in the project (such as field inspectors, surveyors, and materials testers) available to the board.

5-404G (1) Board of Review Secretary

The district will assign a secretary for the board of review. Generally, the district construction claims engineer will serve as the board secretary. Experienced personnel with the requisite organizational and writing skills may also serve as board secretary.

The secretary must do the following:

- Arrange the meeting time and location, and notify the contractor of these details by certified mail a minimum of two weeks before the meeting.
- In the notification, request the contractor to inform Caltrans if the contractor intends to have legal representation present. If the contractor plans to have counsel present at the board meeting, the district should consider having a Legal Service Center representative attend as a legal advisor. A Legal Service Center representative is present only to advise and counsel the board on significant legal issues. Contact the construction field coordinator for advice on including a representative of the Legal Service Center.
- Just before the meeting, verify that the contractor and appropriate subcontractors will attend the meeting.
- Ensure board members have copies of the construction claim report, project plans, and special provisions.
- Perform other tasks in support of the board's efforts.

5-404G (2) Board of Review Member Selection

The Division of Construction maintains and manages a list of available board member candidates, and provides a project-specific, member-candidate list to the board secretary. The board secretary, under the direction of the district director, selects the members and confirms the members' acceptance and availability.

Member candidates are district construction deputy directors and construction managers from outside the district, retired annuitants, construction field coordinators for districts other than the district administering the contract, or other Caltrans personnel at the level of supervising transportation engineer or higher. Members must have at least five years of construction experience and be proficient in analyzing construction contract disputes.

Generally, for claims totaling up to $250,000, the board of review consists of at least one member; for claims totaling between $250,000 and $1,000,000, it has two members; and for claims totaling more than $1,000,000, it has three members. The member or members must have no direct prior involvement with the contract.

One board member is designated as the chairperson. The chairperson informs the meeting attendees of the procedures and format of the meeting and keeps the meeting moving constructively.

5-404G (3) Board of Review Operation

The board will hear only those claims presented with the return of the proposed final estimate. The board will not hear or address new claims. Caltrans prohibits recording the meeting by tape, court reporter, or video.

The members of the board of review must conduct the meeting as follows:

- The chairperson must state that the meeting is being conducted in accordance with the *Standard Specifications*, which require a person or board appointed by

the district director to review claims that remain in dispute after the district's completion of the claim review process.

- The meeting will be informal, an approach that allows the board, secretary, contractor, and district personnel to ask questions. Direct all questions to the chairperson.
- Meeting attendees must recognize that the chairperson controls the meeting. Attendees must only respond when board members request a response.
- Each claim begins with a district representative giving a brief description of the project and the subject of the claim.
- The contractor then has the opportunity to present the claim in detail. The district has already presented its position in the claim report; therefore, this meeting is to provide the contractor with an opportunity to give the contractor's side of the dispute.
- If the contractor attempts to submit new information regarding a claim, the board must inform the contractor that Caltrans does not permit additional claims or additional information regarding claims at this time.
- Once the contractor's position has been presented, the board may ask the Caltrans personnel to clarify information from the construction claim report.
- The district must limit its comments to new information not presented in the claim report. This new information must be to clarify points, not to rebut them.
- The board of review does not make recommendations at the meeting.

After the meeting, the board of review members and secretary meet to clarify and set direction for analysis and review of the claim.

Upon reviewing the construction claim report and all information presented by the contractor in the board of review meeting, the board of review must make its decision. Under the direction of the board chairperson with suggestions from the other board members, the board secretary compiles the board of review report. (See Section 5-410, "Board of Review Report and Determination Guidelines," near the end of this section.)

The board members and others, as determined necessary by the board, must review drafts of the board of review report. Once all comments and corrections have been made, the board secretary will finalize the board report and obtain the members' signatures.

For complex claims or claims of a sensitive nature that may have statewide impact, the board members must consult with the Division of Construction before sending the report to the district director.

When all board members have signed the board of review report, the board secretary will prepare a letter of transmittal and a determination of claims, consisting of the board's conclusions. The board's report and the determination of claims will be delivered to the district director for review and signature.

5-404G (4) Board of Review Not Attended

Failure of the contractor to attend a board of review meeting constitutes a bar to arbitration, in accordance with Section 10240.2, "Administrative Review," of the Public Contract Code. If the contractor's claims are barred from arbitration because of the contractor's failure to attend the meeting, a letter that states these facts will

accompany the final estimate. (For a sample of this letter, see Example 5-4.4, "Sample Final Estimate Letter—No Board of Review Attended," near the end of the section.)

If the contractor did not attend a board of review, the final determination of claims is based on the findings in the claim position letter. The final estimate cover letter serves as the final determination of claims and must be signed by the district director. For information on the final estimate cover letter, see Section 3-914, "Final Estimate," of this manual.

5-404G (5) Board of Review Settlements

The board of review may determine that a negotiated settlement of the claims is appropriate. Settlements negotiated by the board of review chairperson will be submitted as a claim settlement report directly to the Division of Construction. The board secretary prepares the claim settlement report. Do not submit the claim settlement report to the district director until it has been forwarded to the Division of Construction. (For information on preparing a claim settlement report, see Section 5-405B, "Claim Payments Based on Negotiated Settlements," later in this section.)

5-404H Final Determination of Claims—Target Day 240

The determination of claims is the "final determination" and completes the claims resolution process. Caltrans' goal is to deliver the final determination of claims to the contractor no later than 240 days after contract acceptance.

The board secretary, with the assistance of the district construction claims unit, will send the determination of claims to the contractor. Once the determination is sent, the contract is finalized on the basis of the information contained in the determination. The district claims unit will then request the resident engineer to prepare a unilaterally approved contract change order to make any final payment.

The resident engineer must then process the final estimate, reflecting any payments as stated in the determination of claims. Other than sending a copy of the final estimate to the contractor, no further contact or discussion is necessary with the contractor.

The district must issue the final estimate within 30 days of issuing the final determination of claims. For information on the final estimate cover letter, see Section 3-914, "Final Estimate," of this manual.

With the completion of the claims resolution process, Caltrans has fulfilled the contractual requirements. The district must store all project records in accordance with the procedures outlined in Section 5-104, "Final Construction Project Records," of this 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 final determination of claims has not been issued. Therefore, the district must make every effort to issue a final determination on all claims within this timeframe. Should the 240 days elapse and a final determination on all claims has not been issued, the district must consult with the construction field coordinator and the Legal Service Center on how to proceed.

If the contractor chooses to pursue arbitration, the contractor must file for arbitration within the time specified in Section 10240.1, "Commencement of Arbitration," of the Public Contract Code.

5-405 Claim Payments

5-405
Claim Payments

When an agreement is reached with the contractor or entitlement is found on a claim, make payments immediately. Make these payments as described below and in accordance with Table 5-4.1, "Delegation of Authority," near the end of this section. For detailed information on contract payments, refer to Section 3-9, "Measurement and Payment," of this manual.

5-405A Claim Payments Based on Entitlement

If all claims are resolved at the field level or as a result of the district claim meeting, the resident engineer can process a final estimate as soon as a contract change order for a claim resolution is executed and approved. If only some of the claims are resolved, the resident engineer must process a semifinal estimate to release the payments for the resolved claims.

If a claim has some merit and may warrant partial payment of the claimed amount, yet the contractor does not agree this partial payment results in full resolution, the district must discuss how to proceed with the construction field coordinator. The claim position letter must address these types of claims by either finding no merit or finding merit on those specific issues with entitlement to be paid as a unilaterally approved change order, if necessary.

If the board of review determines that money is owed to the contractor, the district should process a unilaterally approved contract change order and then process a final estimate.

5-405B Claim Payments Based on Negotiated Settlements

A negotiated settlement is defined as a compromise of the contract requirements to settle a dispute in Caltrans' best interest. 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. In these situations, the district or the board of review should explore the possibility of settlements with the contractor.

Before presenting actual negotiated settlement offers to the contractor, write a claim settlement report. The claim settlement report must include the following items:

- The scope of the negotiated settlement, including terms and conditions
- Resolution of specific claims or potential claims
- Compromises made in Caltrans' best interest
- Reasons for the compromises
- Methods of payment

Table 5-4.1, near the end of this section, lists the requirements for submittal, recommendation for approval, and approval of the claim settlement report. After approval, bring the negotiated settlement to the contractor for agreement.

If the contractor agrees to the negotiated settlement, prepare a contract change order. The contract change order memorandum must reference the corresponding claim settlement report. However, the contract change order memorandum may not substitute for a claim settlement report, even if the subject matter is simple and can be briefly written. The contract change order must include a statement that signifies the contractor is accepting the compensation provided for in the contract change order as full resolution and settlement of the claim. The contract change order must be signed by the contractor.

The claim settlement report is an internal document covered by the confidential attorney-client communication privilege and must not be given to the contractor or included in the project files. File the original claim settlement report in the Division of Construction confidential files. Also, after approval of the final claim settlement report, destroy all hardcopy and electronic drafts. Do not distribute copies of the final claim settlement report.

5-406 Overhead Claims

5-406 Overhead Claims

Overhead claims generally fall into two categories, home office overhead and field office overhead. All overhead claims must be supported by audit. Overhead claims generally occur when there have been delays to the completion of the contract.

5-406A Home Office Overhead

Home office overhead, or general and administrative expenses, consist of indirect costs that are not associated with a specific project but are the costs of general facilities and administration necessary for the contractor's performance on all contracts.

5-406B Field Office Overhead

Field office overhead consists of indirect costs that are associated with a specific project. These costs do not include costs for labor, materials, or equipment used in performing the work.

5-406C Contractor Submitted Audits

Section 9-1.07B, "Final Payment and Claims," of the *Standard Specifications*, requires that an independent audit report by a certified public accountant (CPA) accompany and support any claim for overhead expenses. The audit report must be prepared at the contractor's expense. When a claim for overhead expenses is received without an independent audit to justify the claimed amount, notify the contractor that the submittal is incomplete and will not be considered until an independent CPA audit report is received. Failure to comply with the request justifies denying the overhead claim.

The Division of Accounting Services, Office of Audits and Investigations, will assist the resident engineer by performing a preliminary check of the independent audit report's compliance with the requirements of the American Institute of Certified Public Accountants (AICPA) Attestation Standards. In addition, the Division of Accounting Services, Office of Audits and Investigations, may review the Caltrans project files and audit the contractor's records.

The Division of Accounting Services, Office of Audits and Investigations will perform the Caltrans audit only if the following conditions exist:

- The district has determined that the state caused a delay to project completion.
- The contractor has submitted an independent CPA audit report that conforms to the AICPA Attestation Standards.
- The Division of Construction has received and prioritized the audit request.
- The contractor has fulfilled the provisions of Section 9-1.07B, "Final Payment and Claims," of the *Standard Specifications*.

For information about requesting an audit, see Section 5-407A, "Audit Request Procedure," later in this section.

5-406D Overhead Payments
Approval of overhead claim payments is subject to the following:

5-406D (1) Home Office Overhead

- Payment less than $500,000 requires approval from the Division of Construction chief
- Payment greater than $500,000 requires approval from the deputy director of Project Delivery

5-406D (2) Field Office Overhead

- Payment less than $200,000 requires approval from the construction field coordinator
- Payment from $200,000 to $ 500,000 requires approval from the Division of Construction chief
- Payment greater than $500,000 requires approval from the deputy director of Project Delivery

5-407 Audits

5-407 Audits

The Division of Accounting Services, Office of Audits and Investigations, can review contractor submitted audits for overhead claims and perform audits of contractor claims such as home office overhead, field office overhead, labor and material cost escalation, and inefficiency costs. These types of claims are generally related to delays to the completion of the contract.

The resident engineer and construction engineer must determine that the claims have entitlement before requesting assistance from the Division of Accounting Services, Office of Audits and Investigations.

5-407A Audit Request Procedure
When it is determined that an audit by the Division of Accounting Services, Office of Audits and Investigations, is needed the resident engineer prepares the district's audit request memorandum for the district construction deputy director's signature. Before forwarding the audit request to the Division of Construction, the district construction deputy director must obtain a signature of concurrence from the construction field coordinator.

The memo must include the following information as appropriate:

- Contract's number
- Contractor's name
- District contact person's name, title, and phone number
- Board of review secretary's name
- A justification

The justification must explain the reasons the contractor has entitlement on the claims and the associated costs that a Caltrans audit needs to verify. The justification must be accompanied by a summary of delay-related claim descriptions and amounts. For a sample summary of delay-related claims, see Example 5-4.6, "Attachment to Audit Request—Summary of Delay-Related Claims," near the end of this section.

Upon receipt of the district's audit request memorandum, the Division of Construction prioritizes the audit request and sends a memorandum to the audit manager of the Division of Accounting Services, Office of Audits and Investigations, requesting an audit of delay-related claims or review of the contractor submitted audit. The Division of Accounting Services, Office of Audits and Investigations, aims to complete the audit within 45 days after receiving the audit request.

5-407B Final Audit Report

The Division of Accounting Services, Office of Audits and Investigations, will perform the audit and forward the final audit report to the Division of Construction. The final audit report is a matter of public record, and its distribution is not limited.

After the Division of Construction receives the final audit report, the construction field coordinator and contract reviewer meet to discuss the report. The construction field coordinator and the district or board of review members will then use the final audit report to determine recoverable costs.

The Division of Construction will keep the final audit report and the audit request for four years.

5-407C Unallowable Expenses

All expenses relating to other business of the contractor must be excluded from the claimed expenses for field office overhead and home office overhead. For typical unallowable expenses, see the Code of Federal Regulations, Title 48, Part 31.205 (48 CFR 31.205).

5-408 Arbitration

5-408 Arbitration

Section 9-1.10, "Arbitration," of the *Standard Specifications*, specifies the requirements for arbitration.

Caltrans Legal Service Center handles all arbitrations. Consequently, when a contractor files for arbitration, all contacts with the contractor regarding the specific project must go through the designated attorney. The resident engineer, the construction engineer, and others, must assist in the arbitration. This assistance may involve preparing calculations, performing technical analysis, preparing documents, assisting in the discovery process, and providing testimony.

For the Legal Service Center's access and ease of discovery, keep project records at one location.

5-409 Construction Claim Report Guidelines

5-409 Construction Claim Report Guidelines

Caltrans uses a construction claim report to document, in an objective and orderly manner, detailed information regarding unresolved claims so that the reader will clearly understand the facts and both sides of the claim. The following guidelines establish the format, content, and suggestions for writing a construction claim report.

5-409A Format

A construction claim report consists of the following sections:

- Title page
- Table of contents
- Project chronology
- General information
- Summary of Resolved Claims (if applicable)

- Summary of Unresolved Claims
- Claim number, title, claim amount
- Background
- Contractor's position
- District's position
- Conclusion
- Exhibits

5-409B Content

The following subsections list in more detail the information that must be included in the construction claim report.

5-409B (1) Title Page

The title page must state the following information:

- "Construction Claim Report"
- "DRAFT" (if appropriate)
- Contract identification data (that is, contract number, district, county, route, kilopost, and federal project number, if applicable)
- Applicable *Standard Specifications* and *Standard Plans*
- Names of the contractor, resident engineer, structure or district representative, construction engineer, structure construction engineer, and report author
- Date of report

5-409B (2) Table of Contents (with page numbers)

The Table of Contents must list the following:

- Each section
- Claim subsections
- All exhibits

5-409B (3) Project Chronology

The project chronology includes the following, as appropriate:

- Advertisement date
- Bid opening date
- Contract award date
- Contract approval date
- First working day (date and working day number)
- Date contractor began work
- Working days specified (number of days)
- Computed completion (date and working day number)

- Contract change order time adjustment (number of days)
- Other days extension (number of days)
- Nonworking days (number of days)
- Suspension days (number of days)
- Working days not worked on controlling operation (number of days)
- Extended date for completion (date and working day number)
- Date work completed
- Contract acceptance date
- Overrun in contract time (number of working and calendar days)

5-409B (4) General Information

Use a narrative format for this section, and include the following:

- Description of the work (preferably one short paragraph)
- Contractor's bid amount
- Proposed final estimate amount
- Date the proposed final estimate was sent to the contractor
- Estimated final cost from proposed final estimate
- Date the contractor returned the proposed final estimate with claims
- Total number and amount of claims submitted
- Dates and descriptions of claim resolution meetings

5-409B (5) Summary of Resolved Claims (if applicable)

If resolved claims exist, prepare a summary table including the following information:

- Numbers and titles
- Claimed amounts
- Resolved amounts

5-409B (6) Summary of Unresolved Claims

Use a table for unresolved claims that uses the same format as the resolved claims table, but do not include a column for resolved amounts. You may omit this summary table if only a few claims exist.

5-409B (7) Claim Number, Title, Claim Amount

Use a boldfaced, underlined title bar for each unresolved claim. In a left-hand column, put the claim number; in the middle column, put the claim title; and in the right-hand column put the claim amount, including days.

5-409B (8) Background

In this section, use a narrative for each claim, including the following types of information:

- Explanations about what happened on the project and what the contract required.
- Facts, not opinions.
- Applicable specifications relevant to the issue. For clarity, you may include a separate section entitled "Applicable Specifications," listing the section numbers and excerpts.
- The circumstances leading to each claim. Use undisputed facts supported with exhibits, where applicable. Exhibits for the facts should include daily reports or letters.
- If the claim includes time considerations, include relevant dates.
- Any actions and responses of the Caltrans' representatives and contractor's personnel.
- The method and time of notification of the dispute. Note the verbal notice of a dispute as well as the response. Clarify how the notice was presented. If the notification was complicated, place this information in a separate section entitled "Notification of Claim."

5-409B (9) Contractor's Position

Quote directly from the contractor's protest, notice, notice of potential claim, or written statement of claims. Add any other pertinent information provided in other documentation. Do not interpret the contractor's position. If the contractor has not stated a basis for the claim, then note that the basis was not stated. State whether a cost analysis was submitted.

5-409B (10) District's Position

Keep this section brief, and avoid repeating or adding background information. State the district's position on each identified issue clearly, directly, and positively. Respond only to relevant contractor points. Do not address or respond to points that are not relevant to the claim's merits. However, make as many relevant arguments as you can to support the position.

5-409B (11) Conclusion

State the district's conclusions on the claim's merit. Briefly state the reason for the conclusions based on the information provided in the report. Do not deny the claim. Only the district director has the authority to deny. You can only recommend denial based on no merit.

5-409B (12) Exhibits

Include the following exhibits as appropriate:

- Copy of the contractor's written statement of claims (that is, the response to the proposed final estimate).
- Correspondence.

- Cost data.
- Notices, protests, or notices of potential claim.
- Detailed chronology of correspondence, other documents, or events.
- CPM schedules or time impact analysis.
- Photographs.

5-409C Suggestions
Use the following suggestions in preparing the construction claim report.

5-409C (1) Helpful Hints

When preparing the construction claim report, the following hints may help:

- Identify specific references in the following manner: "Section xx of the special provisions requires. . . ."
- Quote all excerpts. Avoid paraphrasing them.
- Try to include all pertinent correspondence.
- Include pertinent photographs.
- Provide a response to every relevant contention that the contractor makes.
- As much as possible, use exact dates and numbers.
- State whether days are working or calendar.
- When referring to days, when applicable, include the month, day number, and year.

5-409C (2) Things To Avoid

When preparing the construction claim report, avoid the following:

- Using the words "denied," "rejected," or "determined." Only the district director can use these terms in the final determination.
- Referring to the district claim meeting as "a hearing" when including comments made at the district claim meeting.
- Including a copy of Sections 1 through 9 of the *Standard Specifications*.
- Making the background section of the district's position simply a chronology of letters or events. Write the background as a narrative, referencing any relevant letters or events, if appropriate.
- Including correspondence, photographs, or other exhibits that have no direct bearing on the claim (although all pertinent information should be included).

5-410 Board of Review Report and Determination Guidelines

5-410 Board of Review Report and Determination Guidelines

The district director uses the board of review report to make a final determination of claims. The following establishes the format, content, and guidelines for writing a board of review report and a board of review determination.

5-410A Format

A board of review report follows the general format of a construction claim report. Divide the report into the following sections:

- Introduction written by the board or board secretary and project description, based on the construction claim report
- Chronology, based on the construction claim report
- General information, based on the construction claim report
- A summary of settled claims, if applicable, based on the construction claim report
- Claim number, title, claim amount
- General description of the claim from the construction claim report
- Background, based on the construction claim report
- Contractor's position, based on the construction claim report
- District's position, based on the construction claim report
- Comments of the board, to be written by the board or board secretary
- Conclusions of the board, to be written by the board or board secretary

5-410B Content of Board of Review Report

After the board of review meeting, write the introductory paragraph and add the last two sections, "Comments of the board" and "Conclusions of the board." (See sections 5-410B (1), (2), and (3) for additional information).

Here are some additional guidelines in preparing the report:

- Exhibits in the construction claim report must not be attached to the board report, you may need to do some editing of the contractor's and the district's positions to remove references to the exhibits.
- Do not edit the actual positions as stated in the construction claim report.
- As much as possible, match the construction claim report's style and format, for instance by using the same font size and font type.
- In the top right-hand corner of each page, place the district director's name, the date, and the page number.
- State opinions, facts, positions, conclusions, determinations, and recommendations. However, the important items to present are facts, contract language, and the results of applying the contract to the facts. Do not use words such as "think," "feel," and "believe."
- Quantify any item that can be quantified. If the contractor was inefficient, state that conclusion's basis. If such inefficiency occurred frequently, state how many times and over what time frame.
- Do not include tables in the board conclusions.
- Begin each individual claim on a new page.
- Do not include any language indicating that the report's conclusions comprise the final determination. For all claims, the district director makes the final determination.

- Include signature blocks for the board members and the district director.
- Place all signature blocks on the same page as the final portion of the report's text.

The following subsections contain information specific to the board of review report.

5-410B (1) Introduction

The board of review report must start with an introductory paragraph describing the board meeting attendees and date of occurrence. This section should also include a project description that can be taken from the construction claim report.

5-410B (2) Comments of the Board

In this section of the report, include the following:

- Any new material or a change in position if raised by the contractor at the board meeting.
- Any board requests for additional information or analysis and any general discussion of that information or analysis.
- Other information or statements that are not appropriate in other sections, but which the board considers relevant to the issue and to possible future litigation.

The following are some examples of clauses you can use in this section:

- "At the board of review meeting, the contractor informed the board that . . . "
- "At the board of review meeting, the contractor submitted additional information to support its claim."
- "At the request of the board, the resident engineer reviewed the contractor's submittal and noted . . . "
- "The resident engineer informed the board . . . "
- "At the request of the board . . . "

5-410B (3) Conclusions of the Board

Format this section of the board of review report as a series of bullets that list the board's conclusions. Ensure the bullets convey the board's reasoning and follow a progression that shows what was required, what happened, and what the board determined was relevant to its conclusion. The following are some examples of phrases you can use in the conclusions, beginning with the statement "The board concluded . . . ":

- That the contract provided for . . .
- That the work included . . .
- That pursuant to Item No., item description . . .
- That the contract further provided . . .
- That the contract time is subject to extensions for . . .
- That work began on (date)

- That by correspondence dated (date) . . . the contractor directed the engineer's attention to . . .
- That the contractor requested issuance of a contract change order to provide compensation for . . .
- That the resident engineer disputed the contractor's request and directed the contractor's attention to Section xx of the *Standard Specifications*.
- That on (date) the contractor submitted a notice of potential claim, dated (date) . . . at an estimated costs of $ value.
- That with the return of the proposed final estimate the contractor included a claim for $.
- That the contractor has been compensated for the work of Item No. and that the contractor is not entitled to any additional compensations for that work.

For each claim, end the conclusions with the statement: "Therefore, it is recommended that the claim be denied/allowed in the amount of $."

Also, list the findings of facts as to what actually occurred, including only facts the board can state with certainty. Do not guess or use unverified information in the conclusion.

The board's conclusions are not a settlement of the claim. Instead, it is a complete analysis of the contractor's dispute, beginning with the contract provisions or what the work included. The concluding statement includes the board's recommendation to the district director.

For a sample electronic file of a board of review report, contact the Division of Construction.

5-410C Content of Board of Review Determination

Once the board of review report is complete, prepare a final determination. The final determination consists of the introductory paragraph and the board's conclusions from the board of review report. Change the last conclusion to state "That the claim is denied" or "That the claim is allowed in the amount of $."

Only the district director's signature appears on the final determination. The board of review secretary sends the final determination to the contractor with a cover letter.

Table 5-4.1 Delegation of Authority (1 of 3)

CLAIM ADMINISTRATION		
PERIOD	**ITEM**	**ENTITLEMENT AUTHORITY (see Note 1)**
Prior to Issuance of Proposed Final Estimate	Notices of Potential Claim and Protests	Approvals of contract change orders resolving entitlement potential claims and protests are subject to the delegation authority for contract change orders.
Return of the Proposed Final Estimate Until Board of Review Meeting	Claims	Approvals of contract change orders resolving entitlement claims are subject to the delegation authority for contract change orders.
		Entitlement claim contract change orders subject to district approval (for overhead claims, see Note 2): - District Construction deputy director approves contract change orders, may not be delegated to construction engineers (may be delegated to construction managers). - Fax copy to the contract reviewer for information.
		Entitlement claim contract change orders subject to Division of Construction approval (for overhead claims, see Note 2): - District Construction deputy director provides signature under "submitted by" on contract change order memorandum (see Note 3). - Construction field coordinator provides signature of approval on contract change order memorandum (see Note 3). Approval of the contract change order is subject to the normal delegation of authority for contract change orders.
Board of Review Meeting to Final Estimate	Claims	Approvals of contract change orders resolving entitlement claims are subject to the district director's determination and the delegation authority for contract change orders.
		Entitlement claim contract change orders subject to district approval (for overhead claims, see Note 2): - District Construction deputy director approves contract change orders, may not be delegated to construction engineers (may be delegated to construction managers). - Fax copy to the contract reviewer for information.
		Entitlement claim contract change orders subject to Division of Construction approval (for overhead claims, see Note 2): - Construction division chief provides signature under "submitted by" on contract change order memorandum (see Note 3). - Construction coordinator provides signature on contract change order memorandum (see Note 3) recommending approval. - Division of Construction chief provides signature of approval on contract change order memorandum (see Note 3). Approval of the contract change order is subject to the normal delegation of authority for contract change orders.

Entitlement Notes:

1. Entitlement – merit, even partial, requiring compensation per Public Contract Code Section 10227 "Changes of Plans and Specifications" and per Construction Manual Section 3-403 "Changes."
2. Signature of approval on contract change order memo for overhead entitlement:
   - Field office overhead < $200k coordinator approves, $200k < field office overhead<$500k Division of Construction chief approves, field office overhead > $500k deputy director, Project Delivery approves.
   - Home office overhead < $500k Division of Construction chief approves, home office overhead > $500k the deputy director of Project Delivery approves.
3. Revise the contract change order memorandum as appropriate.

Table 5-4.1 Delegation of Authority (2 of 3)

CLAIM ADMINISTRATION		
PERIOD	**ITEM**	**NEGOTIATED SETTLEMENT AUTHORITY (see Note 1)**
Start of Work Until Final Estimate	Notices of Potential Claim, Protests, and Claims	Claim settlement reports must be submitted to the Division of Construction for all negotiated settlements, with no exceptions. The contract change order memorandum may not be used in lieu of the claim settlement report. The contract change order and contract change order memorandum must be attached to the claim settlement report prior to sending to the Division of Construction. Approval of claim settlement reports resolving settlement of potential claims, protests, and claims is subject to the delegation noted below: **< $500K** The district prepares claim settlement report (see Note 2). - District Construction deputy director submits claim settlement report for approval (see note b). - Construction coordinator recommends approval. - Legal Service Center recommends approval. - Division of Construction chief approves. **≥ $500K** The district prepares claim settlement report (see Note 2). - District director submits claim settlement report for approval (see note b). - Construction coordinator recommends approval. - Legal Service Center recommends approval. - Division of Construction chief recommends approval. - Deputy director of Project Delivery approves. claim settlement report notes: a. Approval of the corresponding contract change order is subject to the normal delegation of authority for contract change orders. The contract reviewer will either provide a contract change order authorization or notify the district to authorize the contract change order. b. The board of review chairperson submits claim settlement report for approval for the district director if it is submitted after the board of review meeting. c. The approved claim settlement report is filed in the Division of Construction confidential files. All drafts should be destroyed.

Negotiated Settlement Notes:

1. Negotiated settlement – Per Public Contract Code Section 9201, "Authority to Compromise Claims," and per the *Construction Manual* Section 5-405B, "Claim Payments Based on Negotiated Settlements."
2. Coordinator, Office of Contract Management chief, district construction deputy director, Legal Service Center representative, and Division of Construction chief meet to discuss negotiated settlement offer. If the amount is greater than $500K, the deputy director of Project Delivery may also attend meeting.

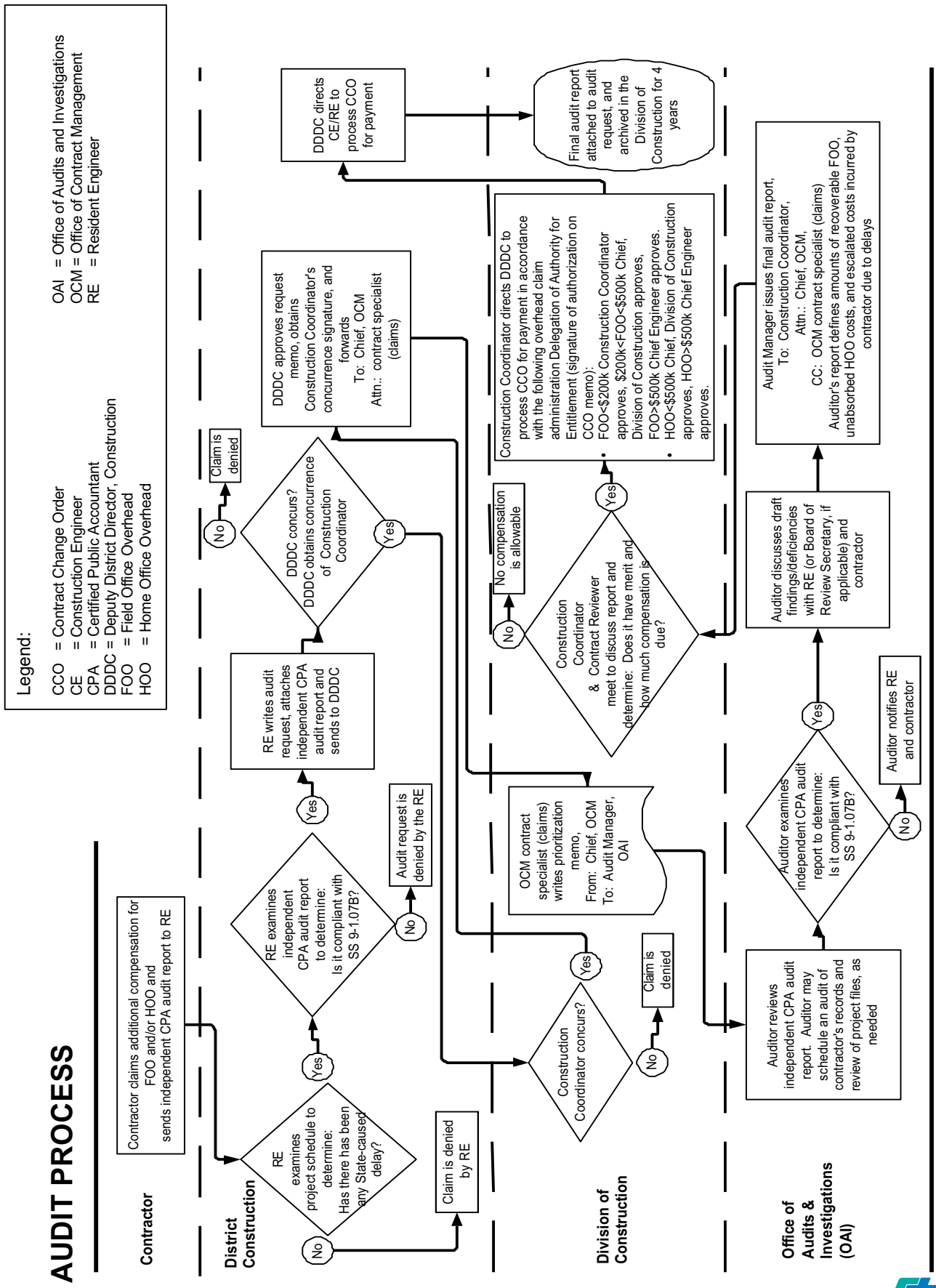
Table 5-4.1 Delegation of Authority (3 of 3)

CLAIM ARBITRATION		
PERIOD	**ITEM**	**NEGOTIATED SETTLEMENT AUTHORITY (see Note 1)**
Request for Arbitration Filed Until Arbitration	Settlement Offers Meeting: Occurs when a contractor offers to settle claims prior to judgement.	Approval of claim settlement reports to settle claims in arbitration are subject to the following delegation: < **$500K** Legal Service Center prepares claim settlement report (see Note 2). - Coordinator recommends approval - District construction deputy director recommends approval. - Division of Construction chief approves. ≥ **$500K** Legal Service Center prepares claim settlement report (see Note 2). - Division of Construction chief recommends approval - District director recommends approval - Deputy director of Project Delivery approves. District issues contract change order with an "issue and approve" from the Division of Construction.
	Pre-Discovery Settlement Meeting: May be requested by Legal Service Center to consider issuing a settlement offer.	
	Post-Discovery Settlement Meeting: Requested by Legal Service Center or Division of Construction to consider issuing a settlement offer.	
Arbitration	Settlements: Contractor offers or Caltrans issues prior to arbitrator award.	
	Awards	1. If additional funding required, district processes request. 2. District issues contract change order with an "issue and approve" from the Division of Construction.

Negotiated Settlement Notes:

1. Negotiated settlement – Per Public Contract Code Section 9201 "Authority to Compromise Claims" and per the Construction Manual Section 5-405B, "Claim Payments Based on Negotiated Settlements."
2. Coordinator, Office of Contract Management chief, district construction deputy director, Legal Service Center representative, and Division of Construction chief meet to discuss negotiated settlement offer. If the offer amount is greater than $500K, the deputy director of Project Delivery may also attend the meeting.

Table 5-4.2 Audit Process



Example 5-4.1 Sample Dispute Response Clauses

The following are some sample clauses you can use in response to disputes. Edit the clauses to fit the specific situation.

5-410D Notice

For a discussion of notices, see Section 5-402A, "Notice," of this manual. Use the following information in your response to a notice.

5-410D (1) General

> I have received your written notification dated May 4, 1999, of a differing site condition encountered at (give location). It is my understanding that you are of the opinion that the material encountered differs materially from that shown on the plans or is considered to be of an unusual nature . . ."

5-410D (2) If no merit

> "I have investigated the material and contract documents (specify which documents) and have found that the material does not vary from that shown on the contract documents. Therefore, no additional cost or time is warranted to complete the work. If you still feel a differing site condition exists, please provide me with any additional information you may have."

5-410D (3) If merit

> "I have investigated the material and contract documents, (specify which documents) and have found that the material does vary from that shown on the contract documents. Therefore, additional cost or time is warranted to complete the work. Please furnish me with the additional costs that may result from the increased work as a result of this differing site condition."

5-410E Protest

For a discussion of protests, see Section 2-7002B, "Protest," of this manual.

5-410E (1) Contract Change Order Time Adjustment

Use the following information in your response to a protest of time determination in a contract change order.

5-410E (1a) General

> "I have received your letter of protest, dated May 4, 1999, regarding the time adjustment under contract change order No. 16. I understand that you are protesting the determination of (x) working days time extension for this change and you believe you should be entitled to (y) working days."

5-410E (1b)If no merit

> "My review of the contract change order, anticipated work, and the progress schedule indicates that the work required by contract change order No. 16 is not the controlling operation [if a CPM review was performed substitute "critical path" for "controlling operation"]. Therefore you are not entitled to a time extension. If you still believe that a time extension is warranted, please provide documentation, either in narrative form or an analysis showing the impact this work on the completion of the project."

5-410E (1c)If merit

> "My review of the change order, anticipated work, and the progress schedule indicates that the work associated with contract change order No. 16 is the controlling operation [if a CPM review was performed substitute "critical path" for "controlling operation"]. Therefore you are entitled to a time extension. I have determined a time extension of (x) days associated with the work. The contract change order will be revised to reflect this change in the adjustment of contract time. Review and sign the contract change order if you agree with the change."

5-410E (2) Weekly Statement of Working Days

Use the following information in your response to a protest of time determination in a weekly statement of working days.

5-410E (2a)General

> "I have received your letter of protest, dated May 4, 1999, regarding weekly statement of working days No. 8. It is my understanding that you are protesting the charging of (specify day or days protested) as a working day because (specify the contractors reasons for protesting the days in question)."

5-410E (2b)If no merit

> "My records indicate that you were working on the controlling operation for the entire day. If you believe that you did meet the requirements of Section 8-1.06, "Time of Completion," of the *Standard Specifications*, please provide me with documentation. Otherwise, I can find no merit to your protest and therefore the charging of a working day will stay in effect."

5-410E (2c)If merit

> "I have reviewed the project records and have determined that April 22, 1999, should be revised to indicate a non-working day. I will send you a revised weekly statement of working days.

5-410F Notice of Potential Claim

For a discussion of the notice of potential claim, see Section 5-402C, "Potential Claim," of this manual. Use the following information in your response to a notice of potential claim.

5-410F (1) General

> "I have received your notice of potential claim dated May 4, 1999, regarding (state issue). It is my understanding that this potential claim is the result of a dispute over (state dispute and give background of the dispute).
>
> I understand your position to be …. (quote the contractor's position as described in the notice of potential claim)"

5-410F (2) If no merit

> "I have reviewed your potential claim and based on the information you provided I find that it has no merit. (Explain why.)"

5-410F (3) If merit

> "I have reviewed your potential claim and based on the information you provided I find that it has merit. (Explain why.) Please provide me with the cost associated with your notice of potential claim for my review and determination of compensation."

5-410G Request for Information

> "I have reviewed your notice of potential claim, and I am unable to make a determination based on the information you provided. Please provide me with the following information so I can make a determination regarding your potential claim."

Example 5-4.2 Sample Construction Claim Report

DEPARTMENT OF TRANSPORTATION
CENTRAL REGION

10-123454
10-ALP-88-0.2

CONSTRUCTION CLAIMS REPORT FOR PROJECT

IN DISTRICT 10

ON

STATE ROUTE 88

LOCATED IN

ALPINE COUNTY ABOUT 90.4 KM EAST OF JACKSON AT KIRKWOOD CREEK

Applicable Standard Specifications - 1995 Edition

Applicable Standard Plans - 1995 Edition

I BUILT MORE CONSTRUCTION, INC.	CONTRACTOR
RE Name	RESIDENT ENGINEER
CE Name	CONSTRUCTION ENGINEER

June 6, 2000

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EXHIBITS

Exhibit 1 Contractor's written statement of claims and certification.....…… 2 Sheets
Exhibit 2 Notice of Potential Claim……. 1 Sheet
Exhibit 3 Resident Engineers Response to the Notice of Potential Claim... 1 Sheet

CHRONOLOGY

EVENT	WORKING DATE	DAY NO.	NO. OF DAYS
Advertisement date	05-24-99		
Bid opening date	06-22-99		
Contract award date	07-19-99		
Contract approved date	07-30-99		
First working day	08-16-99	620	
Begin work	08-16-99		
Working days specified			45
Computed completion date	10-20-99	664	
Contract change order time adjustment			0
Non-working days			6
Suspension days			1
Working days that contractor did not work on the controlling operation			0
Extended date for completion	10-29-99	671	
Date work completed	10-15-99	661	
Contract acceptance date	10-15-99	661	

Overrun in contract time 0 working days (= 0 calendar days)

GENERAL INFORMATION

GENERAL

This project consisted of replacing existing culverts with a pre-cast concrete box culvert. Also, existing highway 88 was realigned by placing asphalt concrete over aggregate base over imported borrow. Metal beam guard railing was placed.

The bid amount was $378,048.00. The proposed final estimate was $399,483.59.

The proposed final estimate was mailed to the contractor on December 20, 1999, and was returned with six (6) exceptions on January 14, 2000. The total amount of the exceptions is $16,155.78. Claim resolution meetings held:

- Field review meeting (resident engineer, construction engineer, and contractor)
- January 31, 2000.
- District claim meeting May 30, 2000.

Summary of Resolved Claims

Claim No./Title	*Claimed*	*Resolved Amount*
Claim #3 – Hancock Steel	$ 490.00	$ 490.00
Claim #4 – Item 27-12.3M	$ 4,920.00	$ 4,920.00
Claim #5 – Item 30-15.14M	$ 1,676.40	$ 0.00
Claim #6 - CCO #1-DEWR's 4 and 7	$ 135.37	$ 130.95
Claim #7 – CCO #3-DEWR's 10 and 21	$ 776.49	$ 776.49
Total Claim Amounts Resolved	$ 7,998.26	$ 6,317.44

Summary of Unresolved Claims

	Claimed Amount	*Resolved Amount*	*Remaining Amount*
Claim #2 – Paving Claim	$ 8,157.52	$ 0.00	$ 8,157.52
Total Claims Amounts Unresolved	$8,157.52	$0.00	$8,157.52

CLAIM No. 2 PAVING CLAIM $ 8,157.52

BACKGROUND

Section 10-1.01, "Order of Work," of the Special Provisions and Sheet SC-1 of the Contract Plans require the contractor to construct this project in two stages. The planned order of work requires that public traffic remains on a paved surface at all times.

Stage 1 construction consisted of placing public traffic on the existing east bound lane, paved shoulder, and a portion on the existing west bound lane while constructing the planned west bound lane and shoulder. Stage 1 work also required replacing existing culverts with a double corrugated steel pipe culvert under the west bound lane and shoulder.

Stage 2 construction consisted of placing all public traffic on the newly constructed westbound lane and shoulder and constructing the planned eastbound lane and shoulder and completing the double corrugated steel pipe culvert.

On August 31, 1999, the contractor planned to place public traffic on a portion of the westbound lane prior to the lane being built to the planned finish grade and paved. The contractor proposed that traffic would run on the slurry cement backfill. The resident engineer required the contractor to backfill the upper portion of the trench with asphalt concrete to provide a paved roadbed for the safety and convenience of public traffic.

NOTIFICATION

Date of Event:	August 31, 1999 to September 2, 1999
Notice of Potential Claim:	September 10, 1999
Notification was timely?:	Yes

APPLICABLE SPECIFICATIONS

Special Provisions:	Section 10-1.01, Order of Work

CONTRACTOR'S POSITION

The contractor's notice of potential claim letter dated September 10, 1999 (see Exhibit 2) states: "The contract only species that traffic runs on pavement. Our proposal was that when we temporarily shifted traffic back over the completed culvert, we would run the traffic on the slurry backfill. Slurry backfill is a hard concrete surface and meets the requirements for

pavement. Caltrans made us backfill the top part of the trench with 100 mm of asphalt concrete. Caltrans should pay us the additional cost of the asphalt concrete."

Submitted with the notice of potential claim was a breakdown of labor, equipment and materials for placing 100 mm of asphalt concrete in the upper portion of the trench. The total cost was calculated using a force account analysis.

DISTRICT CONSTRUCTION'S POSITION

Contract Plans and special provisions require that this project is to be constructed in two specific stages and traffic was to remain on a paved surface throughout the project. The contractor wanted to construct the project outside of the planned construction stages for its convenience and cost savings. However, the contractor was informed by the resident engineer that if it wanted to construct the project outside of the planned construction stages, it must provide a paved roadway at all times for the safety and convenience of public traffic.

The contractors proposal to place traffic on slurry cement backfill was not acceptable. Slurry cement backfill is not pavement. In addition to slurry cement backfill not meeting the definition for pavement it is a poor surface and will spall and create a dangerous condition.

CONCLUSION

Central Region Construction concludes there is no merit to Claim No. 2, because placing traffic on slurry cement backfill does not fulfil the contract requirement that public traffic will always be on a paved surface.

Example 5-4.3 Sample Claim Position Letter

CERTIFIED MAIL – RECEIPT REQUESTED
(Date)

(EA)
(Co-Rte-Kp)

(Contractor)
Attn: (Project Manager)
(Address)

Gentlemen:

District construction has completed its review of the two exceptions (claims) that you filed in your response to the proposed final estimate. These exceptions for the referenced project totaled $ (amount). Attached for your use is a copy of the construction claim report containing detailed findings, dated (date).

Regarding unresolved claims number. 1, and number 2, district construction finds no merit. The total amount unresolved is $ (amount). We request that you drop the unresolved claims. If, however, you do not agree with the findings in this claim position letter, you must request a board of review meeting within 15 calendar days of receipt of this notice.

If you do not request a board of review meeting within the 15 calendar days, it will be assumed that you have accepted the district's conclusions as stated in this claim position letter. You are reminded that if you do not participate in a board of review meeting, which is a required administrative procedure in the Caltrans claims resolution process, you will be barred from arbitration in accordance with Section 10240.2 of the *Public Contract Code*.

Should you request a board of review meeting, the district will convene a board of review for the remaining claims. You will be notified of the time and place for the board of review meeting when these details have been determined.

Sincerely,
Division of Construction Chief

Attachment

cc: RE
CE
CM
District Construction claims engineer
District/Region Construction Office
Construction field coordinator
Division of Construction contract specialist (claims)

Example 5-4.4 Sample Final Estimate Letter--No Board of Review Attended

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY GRAY DAVIS, Governor

DEPARTMENT OF TRANSPORTATION
District X Construction
(ADDRESS)
(PHONE)
(FAX)

CERTIFIED MAIL RETURN RECEIPT REQUESTED

(date)

(Dist-EA)
(Dist-Co-Rte-PM/KP)
Federal Aid Project: (FA#)

(Contractor)
(Address)

Gentlemen:

On (date of board of review meeting), the district convened a board of review meeting, which is a required administrative procedure set forth in the contract as part of Caltrans claims resolution process.

We are issuing the final estimate as authorized by Section 9-1.07B, "Final Payment and Claims," of the *Standard Specifications* and in accordance with the determination of claims provided in the board of review meeting. Payment in the amount of $ (amount) on claim no.'s (1, 2, etc) will be paid on the final estimate. This amount fully resolves claim no. (1, 2, etc). Enclosed is a copy of the final estimate.

This letter is based on the district director's final determination of claims sent to you on (date) and on the board of review recommendations provided on (date). The claims resolution process under the contract is now concluded.

Sincerely,

(NAME)
District Director,

Attachment

Example 5-4.5 Sample Final Estimate Letter--Board of Review Attended

STATE OF CALIFORNIA--BUSINESS, TRANSPORTATION AND HOUSING AGENCY GRAY DAVIS, Governor

DEPARTMENT OF TRANSPORTATION
District X Construction
(ADDRESS)
(PHONE)
(FAX)

CERTIFIED MAIL RETURN RECEIPT REQUESTED

(date)

(Dist-EA)
(Dist-Co-Rte-PM/KP)
Federal Aid Project: (FA#)

(Contractor)
(Address)

Gentlemen:

On (date of board of review meeting), the district convened a board of review meeting, which is a required administrative procedure set forth in the contract as part of Caltrans claims resolution process.

We are issuing the final estimate as authorized by Section 9-1.07B, "Final Payment and Claims," of the *Standard Specifications* and in accordance with the determination of claims provided in the board of review meeting. Payment in the amount of $ (amount) on claim no.'s (1, 2, etc) will be paid on the final estimate. This amount fully resolves claim no. (1, 2, etc). Enclosed is a copy of the final estimate.

This letter is based on the district director's final determination of claims sent to you on (date) and on the board of review recommendations provided on (date). The claims resolution process under the contract is now concluded.

Sincerely,

(NAME)
District Director,

Attachment

Example 5-4.6 Attachment to Audit Request

Summary of Delay-Related Claims

Contract No.:

Contractor:

Claim No.	Claim Description	Amount Claimed (A)	District Analysis (B)	Audit Needed (C)
Delay Claims				
3	FOO	$22,011.06	$0	$22,011.06
4	HOO	$11,655.88	$0	$11,655.88
5	Labor Cost Increases	$5,987.00	$0	$5,987.00
6	Material Cost Increases	$7,685.00	$7,685.00	$0
7	Material Storage Costs	$3,877.00	$0	$3,877.00
Impacted/Unproductive Item Work				
8	Item #4 - Traffic Control	$8,012.98	$0	$8,012.98
9	Item #9 - Roadway Excavation	$4,409.76	$4,409.76	$0
Subcontractor Claims				
12	WWW Fence Co.			
	Material Costs	$9,894.03	$9,894.03	$0
13	Electrical Experts, Inc.			
	Labor Cost Increases	$2,288.09	$0	$2,288.09
TOTALS		$75,820.80	$21,988.79	$53,832.01

(A) Amounts claimed by the contractor.

(B) Amounts which district staff can research and analyze for possible entitlement

(C) Amounts should be audited for possible entitlement.

Section 5 Emergency Contract Administration

5-501 General

5-502 Emergency Force Account Contracts

5-503 Specifications

5-504 Selection of Resident Engineer and Support Staff

5-505 Contractor Selection and Notification

5-506 Initial Stages of the Project

5-507 Tracking Costs

5-508 Prosecution of the Work

5-509 Functional Unit Support

5-510 Public Relations and Communication

5-511 Sample Provisions for Emergency Force Account Contracts

Section 5 Emergency Contract Administration

Section 5 Emergency Contract Administration

5-501 General

5-501 General

An emergency contract is authorized by a director's order. A director's order is a document that approves the use of special authority, delegated by state law, to set aside normal contracting procedures so that Caltrans can quickly initiate and complete emergency work sooner than can be done under normal processes. The district maintenance unit has the responsibility to obtain a director's order for emergency work. Director's orders may also be obtained to prevent the imminent threat of catastrophic damage.

The Public Contract Code, Section 1102, defines an emergency as "a sudden unexpected occurrence that poses clear and imminent danger, requiring immediate action to prevent or mitigate the loss or impairment of life, health, property, or essential public services."

Currently, a district director can approve emergency contracts costing up to $117,000. For emergency work exceeding this threshold amount, the director or delegated deputy director has approval authority.

For guidelines on director's orders, go to the Caltrans Division of Maintenance Intranet site at the following address:

http://onramp.dot.ca.gov/hq/maint/oimms/ha23/index.htm

Deputy Directive 26, "Use of Director's Orders," also covers director's orders.

A number of different types of emergency contracts exist. District construction division is usually involved in emergency force account contracts and emergency informal bid contracts. Emergency informal bid contracts occur once the initial disaster response is accomplished. The district design unit will prepare plans and specifications for this type of contract. For contract administration, follow the normal procedures outlined in the *Construction Manual* (manual).

This section provides guidelines to assist resident engineers in administering emergency force account contracts.

5-502 Emergency Force Account Contracts

5-502 Emergency Force Account Contracts

When time is of the essence to reopen a roadway or facility, or the need to prevent imminent failure exists, a "no-bid" (sole-source) emergency contract is allowed when covered by a director's order. The Office of Procurement and Contracts of the Division of Administrative Services typically prepares and executes these service contracts. The resident engineer becomes the contract manager on a force account contract once work begins.

Form ADM-0366, "Confirmation of Verbal Agreement Other than for Equipment Rental," is the document that allows the contractor to begin work with verbal approval, and the form obligates the contractor to enter into a service contract with Caltrans.

When using the form, which is limited to the highest level of emergency, the work should begin within a day. For written prior approval, the emergency work should begin within a few days of written approval. Do not permit the contractor to begin work until the proper approvals have been obtained.

5-503 Specifications

5-503 Specifications

In the description portion of Form ADM-0366, "Confirmation of Verbal Agreement Other Than for Equipment Rental," add the following:

- A brief description of the work and estimated total cost.
- The location and limits of the work.
- The business enterprise participation goals, if required.
- The statement: "All work will be paid for in accordance with Section 9-1.03, "Force Account Payment," of the Caltrans *Standard Specifications* dated (year) as amended by the attached provisions."

For the current provisions for force account emergency contracts, see the end of this section.

5-504 Selection of Resident Engineer and Support Staff

5-504 Selection of Resident Engineer and Support Staff

The construction engineer must establish adequate staffing levels to ensure control of work, testing, and documentation and to ensure current contract files and fund expenditures. To put an individual in responsible charge at the site, the construction engineer must also expeditiously assign a resident engineer.

When structure work is necessary, use personnel from the Office of Structure Construction.

5-505 Contractor Selection and Notification

5-505 Contractor Selection and Notification

District construction should appoint a construction engineer as "contractor selection coordinator." The district maintenance unit, contractor selection coordinator, and the construction engineer should coordinate their efforts to select a contractor for an emergency contract. The unit that selects, contacts, and notifies the contractor varies in each district. Generally, Caltrans prefers that district construction handle these duties because these divisions are most aware of local contractors' varying capabilities. The Division of Maintenance maintains a registry of contractors available for emergency contracts.

When selecting a contractor for an emergency contract, consider factors such as the following:

- Availability of resources
- Mobilization response time
- Proven management abilities
- Current contractor's license
- Corporate cooperation

Some local contractors can be as responsive and effective as a larger firm, so for quick emergency response, if the smaller firm is available and selecting that firm would prevent delaying other ongoing Caltrans work, consider the smaller firm.

When resource conflicts occur between ongoing and emergency work, and the selected contractor is the best for the emergency contract, district construction must determine the best course of action.

To avoid work conflicts, generally keep to a minimum the number of contractors; however, on large emergency contracts, multiple contractors may be necessary.

A representative from the Caltrans unit coordinating contractor selection will meet with a representative from the selected contractor to sign Form ADM-0366, "Confirmation of Verbal Agreement Other Than for Equipment Rental." A senior-level engineer or higher must also sign Form ADM-0366 when district construction coordinates the selection of the contractor.

5-506 Initial Stages of the Project

A director's order may take several days to obtain. However, in severe emergencies it is possible for the district maintenance unit to obtain verbal approvals by telephone in less than a day from the director or delegated deputy director.

While the director's order is being obtained, representatives from the appropriate district units and divisions, such as district construction, maintenance unit, design unit, and environmental unit, should meet to discuss repair alternatives, cost estimates, and anticipated work duration.

The estimated cost and duration should be realistic. To cover unexpected situations, it is appropriate to place adequate cost and contingency time in the estimates.

During the initial meeting with the contractor, the resident engineer should discuss the scope of work, the proposed types of equipment and personnel, and expectations for performance.

Specifically document all discussions regarding safety. The discussions should include the nature of the operations, interaction with traveling public, worker fatigue, code of safe practices, and designation of the contractor's safety officer. Top priorities are the safe passage of public traffic through or around the work and the safety of workers.

Develop a traffic management plan for the project.

5-507 Tracking Costs

The director's order allows you to proceed with the emergency contract work. It describes the work's scope and limits of the work, funding allocation, and duration. You are legally allowed to authorize fund expenditures up to the director's order amount.

On emergency force account contracts, daily costs can be significant. Assistant resident engineers must include complete records of labor, equipment, and materials in the daily report. At the end of each shift, reach agreement with the contractor on this work. Make a daily estimate of costs based on the daily report. Encourage the contractor to submit a weekly bill itemizing labor, equipment, and material used on the contract.

For additional information on force account billing and record keeping, see Section 3-9, "Measurement and Payment," of this manual.

5-508 Prosecution of the Work

5-508 Prosecution of the Work

The resident engineer must define the work to be done but only provide general direction for accomplishing the work. Generally, the contractor must select the means and methods to be used.

The following bullets list items either that the resident engineer must perform or of which the resident engineer must be aware:

- As the work progresses, work plans will probably need adjusting. If you believe the emergency work is not progressing as quickly as it should, seek management advice, and discuss with the contractor ways to increase production. Be innovative by using the following:
  1. Concurrent operations
  2. Multiple shifts
  3. Local material sites
  4. Detours to limit the effects on traffic
  5. Matches of the desired equipment and resources with the changing circumstances of the work to be performed
- Although cost effectiveness is always desirable, in some emergency situations production must predominate, sometimes requiring excess equipment to sit idle to gain overall production.
- Ensure that the means and methods the contractor proposes are safe and appropriate.
- To ensure environmental mitigations and clearances are obtained, always coordinate with your contractor selection coordinator or project manager.
- Continuously try to prevent improper storm water runoff. Some operations may have unavoidable sediment runoff. To ensure the timely involvement of regulatory agencies, have prior discussions with them, both during the emergency and in the future.
- The governor's emergency proclamation for a disaster may temporarily waive the regulations of the Surface Mining and Reclamation Act of 1975 (SMARA). This waiver is intended to allow Caltrans to use non-SMARA certified locations if no other option is available to reopen a closed facility during the height of an emergency. (Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. You can obtain this list from the Division of Construction or the Department of Conservation's web site at the following address: http://www.consrv.ca.gov/omr/SMARA/3098-list.)

5-509 Functional Unit Support

5-509 Functional Unit Support

District management must assign a project manager to emergency contracts. The project manager will assist the resident engineer in coordinating support from other Caltrans units, other government agencies, the community, and legislators. To allow you more time to properly administer the contract, fully use the project manager and other appropriate units.

5-510 Public Relations and Communication

5-510 Public Relations and Communication

Caltrans management and the public needs accurate project information. To provide this information, follow the guidelines and procedures in Section 1-2, "Public Relations," of this manual. When estimating completion dates, be realistically conservative.

5-511 Sample Provisions for Emergency Force Account Contracts

5-511 Sample Provisions for Emergency Force Account Contracts

Standard Specification modifications are required for emergency force account contracts. Use the following provisions as an attachment to Form ADM-0366, "Confirmation of Verbal Agreement Other Than for Equipment Rental":

The first paragraph of Section 8-1.01, "Subcontracting," of the *Standard Specifications,* is amended to read as follows:

The contractor shall give personal attention to the fulfillment of the contract and shall keep the work under the contractor's control. For all purposes of this contract, a subcontractor is defined as another contractor performing work for the contractor.

Section 9-1.03, "Force Account Payment," of the *Standard Specifications,* is amended to read as follows:

When work is to be paid for on a force account basis, the labor, materials, and equipment used in the performance of the work must be approved by the engineer, and compensation will be determined as follows:

The fourth paragraph of Section 9-1.03A, "Work Performed by Contractor," of the *Standard Specifications,* is amended to read as follows:

If approved by the engineer, work performed for the contractor by a subcontractor and paid for on a force account basis will receive an additional markup of 5 percent, which will be added to the total cost of that work, including all markups specified in Section 9-1.03A. The additional 5 percent markup shall reimburse the contractor for additional administrative costs, and Caltrans will not make any other additional payment by reason of performance of the work.

Section 9-1.03A(1), "Labor," of the *Standard Specifications,* is amended to add the following:

Section 9-1.03A (1d), "Payment of Contractor's Management Personnel". Payment of contractor's management personnel working at the project site and directly on emergency contract work will be made on a "value received" basis, or based on tentatively "agreed upon hourly rates" to include actual base salary costs before the emergency, current employee fringe benefit costs, employer payroll taxes, and related insurance.

"Value received" payment will be made for owners or supervisory personnel at the proper rate for the actual work performed (that is, personnel acting as foremen would be paid at the normal rate for such foremen) and be subject to markups in accordance with Section 9-1.03A(1).

"Agreed upon hourly rates" must not exceed $50 per hour ($104,000 per year). The contractor must calculate such tentatively agreed upon hourly rates and bill them on a provisional basis. Such rates are subject to adjustment at any time as agreeable to both parties, or before final payment, and based on an audit by Caltrans representatives. Such adjustment to the tentatively agreed upon hourly

rates can also be made after final payment, up to three years after acceptance of contract work, and based on an audit by Caltrans representatives. A 15 percent markup will be added to the agreed upon hourly rates to cover general and administrative expenses (overhead) and profit.

The first paragraph of Section 9-1.03A(3), "Equipment Rental," of the *Standard Specifications,* is amended to read as follows:

The Contractor will be paid for the use of equipment at the rental rates listed for that equipment in the Caltrans publication entitled *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)*. The rates used will be those that are in effect on the date upon which the work is accomplished. The rates are also a part of the contract, regardless of ownership and any rental or other agreement, if such agreements may exist, for the use of that equipment entered into by the contractor, except that the overtime and multiple shift differentials shown in the publication *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* shall not apply. All equipment will be paid for at the straight time rate for all hours worked. For those pieces of equipment that have a rental rate of $10 per hour or less, as listed in the *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)* publication and that are rented from a local equipment agency, other than contractor owned, the contractor will be paid at the hourly rate shown on the rental agency invoice or agreement for the time used on force account work as provided in Section 9-1.03A(3a), "Equipment on the Work," *Standard Specifications.* If the local equipment rental agency requires a minimum equipment rental amount, the actual amount charged will be paid to the contractor.

The first paragraph of Section 9-1.03A(3b), "Equipment not on the Work," of the *Standard Specifications,* is amended to read as follows:

For the use of equipment moved in on the work and used exclusively for work paid on a force account basis, the contractor will be paid the rental rates listed in the Caltrans publication entitled *Labor Surcharge and Equipment Rental Rates (Cost of Equipment Ownership)*. The rates used will be those that are in effect on the date upon which the work is accomplished. The rates are also a part of the contract, or determined as provided in Section 9-1.03A(3), except that the overtime and multiple shift differentials shown in the publication *Labor Surcharge and Equipment Rental Rates* must not apply. All equipment will be paid for at the straight time rate for all hours worked. The contractor will be paid the cost of transporting the equipment to the location of the work and returning the equipment to its original location, all in accordance with the following provisions:

Section 9-1.03A(3c), "Owner-Operated Equipment," of the *Standard Specifications,* is amended to read as follows:

Renting owner-operated equipment must conform to the provisions of Sections 9-1.03A(3), "Equipment Rental," 9-1.03A(3a), "Equipment on the Work," and 9-1.03A(3b), "Equipment not on the Work," of the *Standard Specifications,* except as follows:

Fully maintained and operated rental owner-operated equipment used in the performance of work paid for on a force account basis will be paid for at the same hourly rate paid by the contractor. The engineer will establish an hourly rental rate to be paid. The contractor shall provide the engineer with complete information on the hourly rental rates available for rental of fully maintained and operated rental owner-operated equipment.

The provisions in Section 9-1.03A(1), "Labor," of the *Standard Specifications,* shall not apply to operators of rental owner-operated equipment.

To the total of the rental costs for fully maintained and operated rental owner-operated equipment, including labor, Caltrans will add a markup of 15 percent. An additional markup of 5 percent will be added by reason of the performance of the work by a subcontractor. No separate markup will be made for labor.

Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the *Standard Specifications,* is amended to read as follows:

A specialist may perform work when the engineer and the contractor, by agreement, determine that the contractor's forces or any of the subcontractors' forces cannot perform some of the work, or when the engineer requests the contractor to solicit bids. Invoices for the work based on the current market price before the emergency, verifiable by audit by Caltrans representatives, or based on lowest bid price, if bids are solicited, may be accepted without complete itemization of labor, material, and equipment rental costs when the following condition is met: When it is impracticable and not in accordance with the established practice of the special service industry to provide a complete itemization.

In those instances where a contractor must have work performed in a fabrication or machine shop facility away from the job site, the charges for that portion of the work performed in the facility may, by agreement, be accepted as a specialist billing.

To the specialist invoice price, less a credit to the state for any cash or trade discount offered or available, whether or not the discount may have been taken, will be added 15 percent in lieu of the percentages provided in Section 9-1.03A, "Work Performed by Contractor," of the *Standard Specifications.*

Section 1 Sample Types and Frequencies

6-101 General

6-102 Types of Sampling and Testing
6-102A Preliminary Tests
6-102B Initial Samples and Tests
Table 6-1.1 Time Required for Source Testing
6-102C Acceptance Tests
Table 6-1.2 Turn Around Times for Acceptance Tests
6-102C (1) Priority of Testing Samples
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6-105 Field Tested Material Sample Identification

6-106 Contractor Requested Sampling and Testing from Local Deposits

6-107 Shipping of Samples

6-108 Project Certification
Example 6-1.1 Project Certification Memorandum

6-109 Materials

Table 6-1.3 PORTLAND CEMENT CONCRETE (6) – PAVEMENT
Table 6-1.4 PORTLAND CEMENT CONCRETE (6) - BRIDGES & MAJOR STRUCTURES (R.C.B., P.C.C. Arch Culverts, Retaining Walls)
Table 6-1.5 PORTLAND CEMENT CONCRETE MISCELLANEOUS CONCRETE See Notes (6) and (9)
Table 6-1.6 LEAN CONCRETE BASE
Table 6-1.7 CEMENT TREATED BASE ROAD MIX OR PLANT MIX
Table 6-1.8 ASPHALT TREATED PERMEABLE BASE (ATPB)
Table 6-1.9 CEMENT TREATED PERMEABLE BASE (CTPB)
Table 6-1.10 MISCELLANEOUS MATERIALS
Table 6-1.11 MISCELLANEOUS MATERIALS
Table 6-1.12 MISCELLANEOUS MATERIALS

Section 1 Sample Types and Frequencies

Section 1 Sample Types and Frequencies

6-101 General

6-101 General

Sampling and testing materials or products and quality of work must be in strict accordance with contract specifications. Sampling and testing are of equal importance.

Samplers must be familiar with materials handling and processing methods as well as contract requirements. Their knowledge of testing must be sufficient to ensure compatibility between samples and test procedures.

It is the resident engineer's responsibility to ensure the safety of the sampler. The sampler should report any hazardous conditions encountered to the resident engineer. The district weights and measures coordinator inspects material production plants for safety in areas that the sampler will enter.

6-102 Types of Sampling and Testing

6-102 Types of Sampling and Testing

The following describes the different types of sampling and testing used by Caltrans.

6-102A Preliminary Tests

Preliminary tests are tests made prior to award of a contract. Construction personnel rarely sample for preliminary tests. Such tests are used for design purposes to provide data for the materials information package for prospective bidders.

6-102B Initial Samples and Tests

Initial samples and tests are performed on materials proposed for use in the project. These tests determine whether proposed materials or products meet specifications.

Construction personnel may sample potential sources. Tests may be performed by the district materials laboratory or the Office of Materials Engineering and Testing Services, (METS) depending on their respective capabilities.

Soils and aggregate samples to be tested by METS must be forwarded by the district materials laboratory. Do not send them directly to METS.

Sampling and testing potential source materials is not mandatory unless specified. Charge the contractor for the cost of sampling and testing potential sources in accordance with Section 6, "Control of Materials," of the *Standard Specifications*. The normal time required for complete testing of potential sources is as follows:

Table 6-1.1 Time Required for Source Testing

Aggregates for bituminous mixtures	2 weeks
Aggregates for cement treatment	4 weeks
Aggregates for concrete mixture	4 weeks
Aggregates for concrete pavement	60 days
Screenings	2 weeks
Soils	3 weeks
Untreated base materials	3 weeks

6-102C Acceptance Tests

Acceptance tests are tests performed on materials that will be incorporated into the work. Sampling should begin as soon as the material is delivered or in place. Continue acceptance testing as work progresses.

Sample materials entering the work at the locations specified in the *Standard Specifications* or the special provisions. If the sampling location is not specified, sample at the location indicated in the tables, at the end of this section. Sample products such as portland cement concrete, concrete treated base, and asphalt concrete randomly.

Turn around times required for specific acceptance tests performed by a Caltrans materials laboratory are shown in the following table:

Table 6-1.2 Turn Around Times for Acceptance Tests

Material	Priority tests (Work Days)	Normal tests (Work Days)
Aggregates for cement treatment (R-Value only)	5	7
Aggregates for concrete	3	7
Aggregates to be mixed with bituminous material in the lab	10	(priority only)
Base materials, untreated	7	12
Bituminous mixture	3	7
Asphaltic emulsion	3	15
Liquid asphalt	3	15
Paving asphalt	3	15
Portland cement	12	30
Screenings	3	7

	Minimum Time (Work days)
Coating tests	3
Expansion joint material	3
Fencing, all types	2
Guide posts	3
Geosynthetic fabrics	3
Geosynthetic fabrics (UV testing)	45
Metal guardrail	7
Pavement markers	4
Prestressing steel	10
Reinforcing steel and wire	2
Rubber (accompanied by manufacturers test report)	3
Rubber (without test report)	14
Structural steel	10
Type B joint seal	7

6-102C (1) Priority of Testing Samples

Mark all Form TL-0101s, "Sample Identification Card," "Priority" or "Normal".

6-102C (1a) Priority

Use the "priority" designation for the first few samples of each construction material and all acceptance samples and tests of bituminous mixtures. Continue using the priority designation until the resident engineer has assurance that the material being produced is of consistent quality. Use the "priority" designation for all samples if the material being supplied is of questionable quality or if the operation or the source of the material changes.

Indicate if there is a preference for telephone, faxed, or e-mailed test results on Form TL-0101, along with the telephone number of the person who is to receive them.

6-102C (1b) Normal

For tests on samples from potential sources and for samples on materials entering the work after the resident engineer has assurance that the material is of consistent acceptable quality use the "normal" designation. Reports on tests with "normal" designations are distributed by mail.

6-102C (2) Certification of Samplers and Testers

All acceptance testers require certification. No tests or samples are to be taken on Caltrans projects unless the tester is certified in the test being performed.

Training and certification of samplers and testers is covered in detail in the *Quality Assurance Program Manual.*

6-102D Independent Assurance Sampling and Testing

Independent assurance sampling and testing is the responsibility of the district materials engineer. See the *Quality Assurance Program Manual* published by METS for details. The district materials unit keeps results of independent assurance samples and tests.

If any of the assurance tests fail, the tester will notify the resident engineer immediately by telephone.

6-102E Federal Highway Administration Samples and Tests

When the project includes federal funding, a representative of the Federal Highway Administration (FHWA) may select samples or sample locations. Label the sampling, directed by FHWA, "FHWA Check Samples," and send them to either the district materials laboratory or METS for testing. FHWA, the district materials engineer, and the resident engineer receive copies of test results for check samples.

6-102F Special Samples and Tests

Specific problems such as roadway failures, difficulty in achieving required densities, or inconsistent test results, may require special samples and tests. When such material problems are encountered, contact the district materials engineer. The district materials engineer may request help from the Division of Construction or METS. The unit that requests a research project will provide oversight for special investigations and sampling.

6-103 Acceptance Records

6-103 Acceptance Records

Keep records of all samples and tests in the project files as permanent job records. Materials incorporated into the project, represented by failing tests, must be documented in the project files also. For more information on procedures to follow in the case of failing tests refer to Section 3-6, "Control of Materials," of this manual.

It is not necessary to secure separate samples for each project when two or more projects receive materials from the same source. File a copy of the test report with each project.

6-104 Test Result Summary

6-104 Test Result Summary

Monitor acceptance testing by using form CEM-3701, "Test Result Summary." Corrective action or retesting failing tests must be noted in the "Remarks" column of the form.

6-105 Field Tested Material Sample Identification

6-105 Field Tested Material Sample Identification

Prepare Form TL-0101, "Sample Identification Card," in accordance with the following details:

- Fill in every blank space with complete information, including the quantity and lot of the material sampled.
- Distribute copies as shown on the form on the same day the sample is shipped.
- The "Location of Source" must clearly indicate the place where the sample was obtained.
- For liquid asphalts, paving asphalts and asphaltic emulsions include the refinery designations and shipment number. This data is available from the Certificate of Compliance that accompanies the materials.
- For asphalt concrete samples, be sure to:
  1. Identify the plant producing the material.
  2. Include the type of mix and maximum size of aggregate represented by the sample.
  3. Under "Remarks," include the grade and source of the bituminous binder contained in the sample.
  4. Under "Remarks," record the percentage of bituminous binder designated by the engineer.
- Be sure that the Sample Identification Card indicates the use for which the material is intended so that the proper tests will be performed. This is especially important for electrical conductors, as the applicable specifications depend on where and how the conductor is to be used. Without this information, the testing engineer does not know what specification to use in determining compliance.
- Indicate whether it is intended to crush oversize material or if any special blends are contemplated for potential sources of aggregate testing.
- To protect the Sample Identification Card against moisture or stains, place it in an oil and waterproof envelope.

6-106 Contractor Requested Sampling and Testing from Local Deposits

6-106 Contractor Requested Sampling and Testing from Local Deposits

When charging the contractor for testing local materials as specified in Section 6-2, "Local Materials," of the *Standard Specifications* note this under "Remarks" on Form TL-0101. The district materials laboratory will advise the resident engineer of the amount of the charges.

6-107 Shipping of Samples

6-107 Shipping of Samples

When shipping samples from the job to the laboratory, use the most economical mode of transportation available consistent with the time element involved. Do not ship samples cash on delivery to METS.

6-108 Project Certification

6-108 Project Certification

Send a materials certification memorandum to the Division of Construction upon completion of each project. File a copy of the memorandum in the job files and forward the original to the Division of Construction as soon as possible, preferably with submission of the final or semifinal estimate. Note All non-conforming materials on the memorandum. This includes materials accepted at reduced pay factors under acceptance specifications.

For federally funded projects early submission of the memorandum is necessary to expedite the submission of a voucher to FHWA.

A construction engineer must sign the materials certification memorandum.

An example materials certification memorandum follows:

Example 6-1.1 Project Certification Memorandum

State of California

Business Transportation and Housing Agency

Memorandum

To: _____
Divisision of Construction
Attention: Progress Pay Coordinator

Date:
File: Category 61
Job Stamp:

From: **DEPARTMENT OF TRANSPORTATION**

Subject: Materials Certification

This is to certify that:

The results of the tests on acceptance samples indicate that the materials incorporated in the construction work and the construction operations controlled by sampling and testing were in conformity with the approved plans and specifications

☐ Exceptions to the plan and specifications are explained on the back of this memorandum (or on attached sheet).

☐ No Exceptions to the plans and specifications were found.

_____*(signed by a Construction Engineer)*_____

6-109 Materials

6-109
Materials

The tables on the following pages provide a guide for sampling and testing requirements.

Close adherence to the sample size requirement shown in the table will prevent unnecessary delays and the expense of obtaining supplementary samples to complete tests.

The frequency of sampling indicated in the tables is a guide under normal conditions. Materials well within specifications and uniform in character may require less frequent sampling and testing.

In the project files, document adjustments to the testing frequencies shown in the tables.

Table 6-1.3 PORTLAND CEMENT CONCRETE – PAVEMENT (1 of 3)

PORTLAND CEMENT CONCRETE, See Notes (6) (9) - PAVEMENT

MATERIAL OR PRODUCT		TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS FREQUENCY OF SAMPLING	REMARKS
AGGREGATE	COARSE AGGREGATE	LA Rattler (500 Rev.) See Note (6)	211	See Note (3)	See Note (2)		1 for every 3,000m^3, if preliminary tests show abrasion loss greater than 40%. See Note (1)
		Cleanness Value	227			1 for every 400m^3, 1 per day min. See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	Recommend 1 acceptance test per day if 3 consecutive tests over 80
		Alkali Silica Reactivity	ASTM C1293 or ASTM C1260	Aggregate producer submits certified test results from qualified lab to METS for approval			Contact METS for list of approved sources
	FINE AGGREGATE	Colometric Test	213	See Note (3)	See Note (2)	Only if initial test shows critical or contamination is suspected	
		Mortar Strength	515				
		Sand Equivalent	217			1 for every 400 m^3, See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	Recommend 1 acceptance test per day if 3 consecutive tests over 80
		Durability	229				

Table 6-1.3 PORTLAND CEMENT CONCRETE – PAVEMENT (2 of 3)

	COARSE & FINE AGGREGATE	Specific Gravity & Absorption	206, 207	See Note (3)	See Note (2)	When aggregate source changes, See Note (7)	
		Soundness	214				Soundness for Fine Aggregate waived if durability is > 60
		Sieve Analysis	202			1 for every 400 m^3, 1 per day min. See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	
		Freeze-Thaw	528	See Note (4)	See Note (5)		
		Moisture	223 &/or 226		Not applicable	1 for every 400 m^3, 1 per day min. See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	Sample must be in an airtight container
CEMENT		Various Properties		3.5 kg	None with Certificate of Compliance (See REMARKS)	1 for every 400 m^3, 1 per day min. See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	If no Certificate of Compliance, sample at least 14 days prior to use for previously tested brands, 35 days for untested brands
WATER		Chlorides, Sulfates	405, 422, 417	Clean 2- L plastic jug with lined, sealed lid.	At point of use (See REMARKS)	As required for acceptance (See REMARKS)	City water supplies for domestic use usually need not be tested unless suspected of high chloride or sulfate content. On-job-wells are to be tested
ADMIXTURES	AIR ENTRAINING AGENT	Air entraining properties, chloride identification	ASTM C260	1-L can or plastic bottle of liquid, 1 kg of powder	Samples must reach METS at least 1 week prior to use	As new supplies arrive on the job or each time brand is changed	Prior to sampling and testing, check with METS for brands that may be used when properly certified
	WATER REDUCERS OR SET RETARDERS	Claimed properties, chloride identification	ASTM C494	1-L can of liquid, 1 kg of powder	Samples must reach METS at least 1 week prior to use, untested brands require 5 weeks prior to use		

CONCRETE	Yield	518	See test method. See Note (8)	See ASTM C172	1 for each 4 hours production	If yield test used for payment, 1 per each 1200 m^3, min. or 2 per mix design per job
	Ball Penetration	533			When test specimen is fabricated and when consistency or uniformity is questionable, min 2 per day	
	Modulus of Rupture	523	1 set of 3 beams 150 x 800 mm (min.) for centerpoint loading and 150 x 150 x 510 mm (min.) for third-point loading		1 set for each 3,000 m^3	Recommend min. 2 sets per shift. Normally, from each set, break 1 beam at 7 days, 1 beam at 10 days, and 3rd beam as required, 50% decrease after 10 sets if all in compliance
	Air Content	504			As required, min. once every 4 hours, each time 518 is performed	Where specified for freeze thaw resistance, acceptance testing shall not be less than once every hour
	Coarse aggregate per m^3 of concrete	529	45 kg		As required to assure uniformity of concrete, see Standard Specifications, Section 90-6.01	
	Thickness	531			As required, see Standard Specifications, Section 40-1.35	
PIGMENTED CURING COMPOUND	Compliance (See Standard Specifications & special provisions)		1-L can		As new shipments arrive on job or each time brand is changed	For chlorinated rubber base type, sample and test if not previously inspected at the source

Note:

(1) Not required if P.C.C. from same source is used on other work and test is being made there. No need to duplicate the test just for the sake of record. The actual test results may be used anywhere they are applicable.

(2) From material site or stockpile: 60 days prior to use.

(3) 70 kg of 63 mm x 37.5 mm - 45 kg of 37.5 mm x 19 mm - 35 kg of 19 mm x No. 4-35 kg of pea gravel - 25 kg of sand. This material for test numbers 202, 206, 207, 211, 213, 214, 217, 227, 229 and 515.

(4) See California Test No. 528 or contact the Office of Materials Engineering and Testing Services (METS).

(5) Contact district materials engineer for special sampling procedures at least 120 calendar days before intended use.

(6) For lightweight concrete, see Standard Specifications and special provisions.

(7) When prior test results are acceptable and material appears to be of uniform composition, a max. of 2 tests per day will satisfy acceptance test requirements for this material. Adjustments to testing frequencies shall be documented in the project files.

(8) No deductions for cement content will be made based on the results of California Test No. 518.

(9) See California Test No. 125 for sampling procedures.

Table 6-1.4 PORTLAND CEMENT CONCRETE (6) - BRIDGES & MAJOR STRUCTURES (R.C.B., P.C.C. Arch Culverts, Retaining Walls) (1 of 3)

PORTLAND CEMENT CONCRETE, See Notes (6) (9) - BRIDGES & MAJOR STRUCTURES (R.C.B., P.C.C Arch Culverts, Retaining Walls)

MATERIAL OR PRODUCT		TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS FREQUENCY OF SAMPLING	REMARKS
AGGREGATE	COARSE AGGREGATE	LA Rattler (500 Rev.) See Note (6)	211	See Note (3)	See Note (2)		
		Cleanness Value	227			1 for every 400 m^3, 1 per day min. See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3.	Recommend 1 acceptance test per day if 3 consecutive tests over 80
		Alkali Silica Reactivity	ASTM C1293 or ASTM C1260	Aggregate producer submits certified test results from qualified lab to METS for approval			Contact METS for list of approved sources
	FINE AGGREGATE	Colometric Test	213	See Note (3)	See Note (2)	Only if initial test shows critical or contamination is suspected	
		Mortar Strength	515				
		Sand Equivalent	217			1 for every 400 m^3, See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	Recommend 1 acceptance test per day if 3 consecutive tests over 80
		Durability	229				
	COARSE & FINE AGGREGATE	Specific Gravity & Absorption	206, 207	See Note (3)	See Note (2)	When aggregate source changes, See Note (7)	
		Soundness	214				Soundness for Fine Aggregate waived if durability is > 60
		Sieve Analysis	202			1 for every 400 m^3, See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	
		Freeze-Thaw	528	See Note (4)	See Note (5)		
		Moisture	223 &/or 226		Not applicable	1 for every 400 m^3, 1 per day min. See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	Sample must be in an airtight container

Table 6-1.4 PORTLAND CEMENT CONCRETE (6) - BRIDGES & MAJOR STRUCTURES (R.C.B., P.C.C. Arch Culverts, Retaining Walls) (2 of 3)

CEMENT		Various Properties		3.5 kg	None with Certificate of Compliance (See REMARKS)	1 for every 400 m^3, 1 per day min. See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	If no Certificate of Compliance, sample at least 14 days prior to use for previously tested brands, 35 days for untested brands
WATER		Chlorides, Sulfates	405, 422, 417	Clean 2- L plastic jug with lined, sealed lid	At point of use (See REMARKS)	As required for acceptance (See REMARKS)	City water supplies for domestic use usually need not be tested unless suspected of high chloride or sulfate content. On-job-wells are to be tested
ADMIXTURES	AIR ENTRAINING AGENT	Air entraining properties, chloride identification	ASTM C260	1-L can or plastic bottle of liquid, 1 kg of powder	Samples must reach METS at least 1 week prior to use	As new supplies arrive on the job or each time brand is changed	Prior to sampling and testing, check with METS for brands that may be used when properly certified
	WATER REDUCERS OR SET RETARDER	Claimed properties, chloride identification	ASTM C494	1-L can of liquid, 1 kg of powder	Samples must reach METS at least 1 week prior to use, untested brands require 5 weeks prior to use		
CONCRETE		Yield	518	See test method. See Note (8)	See ASTM C172	As necessary to assure accuracy of mix design; min. 2 per each mix design	
		Ball Penetration	533			When test specimen is fabricated & when consistency or uniformity is questionable, min. 2 per day	
		Slump	ASTM C143				Concrete placed under water, seal course
		Compressive Strength	ASTM C172, 540	1 set of 125 x 250 mm cylinders for each test	See ASTM C172	1 set for approximately every 250 m^3 concrete or as required for acceptance. Min. 1 set per job and class of concrete for each days production of critical structural elements	For trial batches, see Standard Specifications or job special provisions and Section 6-3 of this manual
		Air Content	504			Min. once every 4 hours of production and when test specimens are fabricated	Where air is specified for freeze-thaw resistance, a min. of 1 per each 25 m^3
		Coarse aggregate per m^3 of concrete	529			As required to assure uniformity of concrete, see Standard Specifications, Section 90	

Table 6-1.4 PORTLAND CEMENT CONCRETE (6) - BRIDGES & MAJOR STRUCTURES
(R.C.B., P.C.C. Arch Culverts, Retaining Walls) (3 of 3)

PRESTRESSED TENDON GROUT	Efflux time	541	1-125 x 250 mm cylinder mold can	From batch immediately after mixing for prequalification, thereafter from outlet end of tendon and/or storage tank	At the start of each day's work and thereafter 1 test per each 5% of ducts	Repeat acceptance tests whenever source of material is changed
PIGMENTED CURING COMPOUND	Compliance (See Standard Specifications and special provisions)		1-L Can		Periodically to ensure compliance	

Note:

(1) Not required if P.C.C. from same source is used on other work and test is being made there. No need to duplicate the test just for the sake of record. The actual test results may be used anywhere they are applicable.

(2) From material site or stockpile; 60 days prior to use.

(3) 70 kg of 63 mm x 37.5 mm - 45 kg of 37.5 mm x 19 mm - 35 kg of 19 mm x No. 4-35 kg of pea gravel - 25 kg of sand. This material for test numbers 202, 206, 207, 211, 213, 217, 227 229 and 515.

(4) See California Test No. 528 or contact the Office of Materials Engineering and Testing Services (METS).

(5) Contact district materials engineer for special sampling procedures at least 120 calendar days before intended use.

(6) For lightweight concrete, see Standard Specifications and special provisions.

(7) When prior test results are acceptable and material appears to be of uniform composition, a max. of 2 tests per day will satisfy acceptance test requirements for this material. Adjustments to testing frequencies shall be documented in the project files.

(8) No deductions for cement content will be made based on the results of California Test No. 518.

(9) See California Test No. 125 for sampling procedures.

Table 6-1.5 PORTLAND CEMENT CONCRETE MISCELLANEOUS CONCRETE

PORTLAND CEMENT CONCRETE MISCELLANEOUS CONCRETE, See Notes (6) (9) (10)

MATERIAL OR PRODUCT		TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS FREQUENCY OF SAMPLING	REMARKS
AGGREGATE	COARSE AGGREGATE	LA Rattler (500 Rev.) See Note (6)	211	See Note (3)	See Note (2)		
		Cleanness value	227			1 for every 400m^3, 1 per day min. See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	Recommend 1 acceptance test per day if 3 consecutive test over 80
	FINE AGGREGATE	Colometric Test	213	See Note (3)	See Note (2)	Only if initial test shows critical or contamination is suspected	
		Mortar Strength	515				
		Sand Equivalent	217			1 for every 400 m^3, See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	Recommend 1 acceptance test per day if 3 consecutive tests over 80
		Durability	229				
	COARSE & FINE AGGREGATE	Specific Gravity & Absorption	206, 207	See Note (3)	See Note (2)	When aggregate source changes, See Note (7)	
		Soundness	214				Soundness for Fine Aggregate waived if durability is > 60
		Sieve Analysis	202			1 for every 400 m^3, See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	
		Freeze-Thaw	528	See Note (4)	See Note (5)		
		Moisture	223 &/or 226		Not applicable	1 for every 400 m^3, See Notes (1) (7). If production is less than 250 m^3, 1 per accumulative 250 m^3	Sample must be in an airtight container
CEMENT See Note (6)		Various Properties		3.5 kg	None with Certificate of Compliance (See REMARKS)	1 for each 400 m^3 used. 1 per day min., 2 per day max. See Note (1). See Section 6-2 of this manual	If no certificate of Compliance, sample at least 14 days prior to use for previously tested brands, 35 days for untested brands

Table 6-1.5 PORTLAND CEMENT CONCRETE MISCELLANEOUS CONCRETE cont.

WATER		Chlorides, Sulfates	405, 422, 417	Clean 2- L plastic jug with lined, sealed lid.	At point of use (See REMARKS)	As required for acceptance (See REMARKS)	City water supplies for domestic use usually need not be tested unless suspected of high chloride or sulfate content. On-job-wells are to be tested
ADMIXTURES	AIR ENTRAINING AGENT	Air entraining properties, chloride identification	ASTM C260	1-L can or plastic bottle of liquid, 1 kg of powder	Samples must reach METS at least 1 week prior to use	As new supplies arrive on the job or each time brand is changed	Prior to sampling and testing, check with METS for brands that may be used when properly certified
	WATER REDUCERS OR SET RETARDERS	Claimed properties, chloride identification	ASTM C494	1-L can of liquid, 1 kg of powder	Samples must reach METS at least 1 week prior to use, untested brands require 5 weeks prior to use		
CONCRETE		Yield, Cement Factor	518	See test method, See Note (8)	See ASTM C172	As necessary to assure accuracy of mix design, min. 2 per each mix design	If yield test used for payment, 1 per each 1200 m^3, min. of 2 per mix design per job
		Ball Penetration	533			When test specimen is fabricated & when consistency or uniformity is questionable, Min. 2 per day	
		Slump	ASTM C143				Concrete placed under water
		Compressive Strength	ASTM C172 , 540	1 set of 125 x 250 mm cylinders		One set for each day when volume exceeds 20 m^3, See Note (1). None if total days run less than 20 m^3	
		Air Content	504			As required. See specifications.	Where specified for freeze-thaw resistance

Note:

(1) Not required if P.C.C. from same source is used on other work and test is being made there. No need to duplicate the test just for the sake of record. The actual test results may be used anywhere they are applicable.

(2) From material site or stockpile; 60 days prior to use.

(3) 70 kg of 63 mm x 37.5 mm - 45 kg of 37.5 mm x 19 mm - 35 kg of 19 mm x No. 4-35 kg of pea gravel - 25 kg of sand. This material for test numbers 202, 206, 207, 211, 213, 217, 227 229 and 515.

(4) See California Test No. 528 or contact the Office of Materials Engineering and Testing Services (METS).

(5) Contact district materials engineer for special sampling procedures at least 120 calendar days before intended use.

(6) For minor concrete, sample and test only at resident engineer's discretion.

(7) When prior test results are acceptable and material appears to be of uniform composition, a max. of 2 tests per day will satisfy acceptance test requirements for this material. Adjustments to testing frequencies shall be documented in the project files.

(8) No deductions for cement content will be made based on the results of California Test No. 518.

(9) For lightweight concrete, see Standard Specifications and special provisions.

(10) See California Test No. 125 for sampling procedures.

Table 6-1.6 ASPHALT CONCRETE

ASPHALT CONCRETE, See Notes (2) (3)

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS FREQUENCY OF SAMPLING	REMARKS
AGGREGATE PRIOR TO MIXING	LA Rattler (500 Rev.)	211	Type A & B UNPROCESSED 115 kg	Materials site, stockpile, or plant, See Note (7)	As necessary for acceptance, See Note (8)	
	Specific Gravity (coarse and fine aggregate)	206, 208	PROCESSED 25 kg of each bin size			
	CKE	303				
	% Crushed Particles	205	Open graded 25 kg			
	Sieve Analysis	202,105			1 for each 450 tonnes, 1 per day min., 2 per day max, See Notes (1) (4) (5). If production is less than 750 m^3, 1 per accumulative 250 m^3	
	Sand Equivalent	217				
	Film Stripping	302			As necessary for acceptance	Made on open graded asphalt concrete only
PAVING ASPHALT, LIQUID ASPHALT, ASPHALTIC EMULSION	In accordance with applicable section of Standard Specifications		Asphalt 1-L can	Test if no Certifications of Compliance. Asphalt line, See Note (6)	Once daily, See Note (6)	
			Emulsion 2-L plastic jug	Test if no Certification of compliance. Emulsion Storage Tank	Each Shipment	

Table 6-1.6 ASPHALT CONCRETE cont.

COMPLETE MIXTURE	Swell	305	DGAC 7 KG CARTON OGAC 1- L can		As necessary for information and/or acceptance	When less than a total of 450 tonnes is to be placed, sample and test only at resident engineers discretion Total Sample: DGAC: Four Cartons (about 30 kg) OGAC: Four 1-L cans (about 6 kg)
	Moist, Vapor Susceptibility	307				
	Stabilometer	366				
	Sieve Analysis	202				
	Asphalt Content	310, 362, 379			1 for each 450 tonnes, 2 per day min.	
	Moisture	310, 370				
	In-Place Density	375	As specified or lot size		1 sample representing each 4 hours of production	
	Max. Density	375	Two 7-kg cartons		As per California Test 375	

Note:

(1) On smaller projects being supplied from sources currently in use on larger projects, a copy of the acceptance test information on asphalt concrete aggregate is all that is required.

(2) See California Test No. 125 for sampling procedures.

(3) When special provisions state that production shall be "from commercial quality asphalt and aggregate", sample and test only at resident engineers discretion.

(4) Not required if P.C.C. from same source is being used on other work and test is being made there. No need to duplicate tests, results may be used anywhere they are applicable.

(5) When prior test results are acceptable and material appears to be of uniform composition, a max. of 2 tests per day will satisfy acceptance test requirements for this material. Adjustments to testing frequencies shall be documented in the project files.

(6) When continuous mixing plants used, sample and test for specific gravity at least monthly.

(7) When sampling for AC mix design (California Test No. 367), aggregate samples must be taken from the combined feed in advance of mixing, for batch mixing, samples from hot bins.

(8) Refer to Standard Specifications 39-3.03, "Proportioning" for frequency of AC mix design (California Test No.367) sampling.

Table 6-1.7 LEAN CONCRETE BASE

LEAN CONCRETE BASE, See Note (2)

MATERIAL OR PRODUCT		TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS: LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS: FREQUENCY OF SAMPLING	REMARKS
AGGREGATE		Sand Equivalent	217	45 kg for aggregate qualification	Materials site or stockpile	1 sample for each 2500 tonnes or 1500 m^3, See Note (1)	
		Sieve Analysis	202, 105				
		Compressive strength of laboratory mixtures, recommended min. cement content	548				
CEMENT		Various Properties		3.5 kg	None with Certificate of Compliance (See REMARKS)	Each 100 tonnes of cement, 2 per day max.	If no Certificate of Compliance, sample at least 14 days before use for previously tested brands, 35 days for untested brands
WATER		Chlorides, Sulfates	405, 422, 471	Clean 2-L plastic jug with lined, sealed lid	At point of use (See REMARKS)	As required for acceptance (See REMARKS)	City water supplies for domestic use need not be tested unless suspected of high chloride or sulfate content. On-the-job wells are to be tested
ADMIXTURES	AIR ENTRAINING AGENTS	Air entraining properties, chloride identification	ASTM C260	1-L can or plastic bottle of liquid, 1 kg of powder	Samples must reach METS at least 1 week prior to use, untested brands require 5 weeks prior to use	As new supplies arrive on the job or each time brand is changed	Prior to sampling and testing, contact METS for brands which may be used prior to sampling and testing when properly certified
	WATER REDUCERS OR SET RETARDERS	Claimed properties, chloride identification	ASTM C494	1-L can of liquid, 1 kg of powder			

Table 6-1.7 LEAN CONCRETE BASE cont.

COMPLETED MIXTURE	Ball Penetration	533		See ASTM C172	At least once for every 4 hours of production	
	Air Content	504			At least once for each day's production	
	Dimensions				As required	
CURING COMPOUND	Compliance with specifications		1-L can		As new shipments arrive on job or each time brand is changed	

Note:

(1) If material is uniform and well within specification limits, the frequency is decreased to 1 a day unless source is changed. Adjustments to testing frequencies shall be documented in the project files.

(2) See California Test No. 125 for sampling procedures.

Table 6-1.8 CEMENT TREATED BASE ROAD MIX OR PLANT MIX

CEMENT TREATED BASE ROAD MIX OR PLANT MIX, See Note (2)

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS: LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS: FREQUENCY OF SAMPLING	REMARKS
AGGREGATE	R-Value (with & without cement)	301	45 kg for aggregate qualification	Materials site or stockpile		Class B only
	Compressive Strength	312				Class A
	Sieve Analysis	202, 105			1 sample for each 2750 tonnes or 1500 m^3, See Note (1)	Minimum 1 acceptance test per project on smaller projects
	Sand Equivalent	217				
COMPLETED MIX	Compressive Strength	312	See California Test 312 Part II		See Section 4-27 of this manual	
	Cement Titration	338	See California Test 338 Part I		As necessary for acceptance (See REMARKS)	Use min. of 1 person full time during full-time operation
	Relative Compaction	312, 216, 231			1 sample for each 2750 tonnes or 1500 m^3, See Note (1)	
	Thickness				As necessary for information	
CEMENT	Various Properties		3.5 kg	None with Certificate of Compliance (See REMARKS)	Each 100 tonnes of cement, 2 per day max.	If no Certificate of Compliance, sample at least 14 days before use for previously tested brands, 35 days for untested brands
WATER	Chlorides, Sulfates	405, 422, 417	Clean 2-L plastic jug with lined, sealed lid	At point of use (See REMARKS)	As required for acceptance (See REMARKS)	City water supplies for domestic use need not be tested unless suspected of high chloride or sulfate content. On-the-job wells are to be tested
LIQUID ASPHALT	In accordance with special provisions & Standard Specifications		1-L can	None with Certificate of Compliance. If no Certificate of Compliance, then from storage tank of distributor truck	Each Shipment	

Note:

(1) If material is uniform and well within specification limits, the frequency is decreased to 1 per day unless source is changed. Adjustments to testing frequencies shall be documented in the project files.

(2) See California Test No. 125 for sampling procedures.

Table 6-1.9 ASPHALT TREATED PERMEABLE BASE (ATPB)
Table 6-1.10 CEMENT TREATED PERMEABLE BASE (CTPB)

ASPHALT TREATED PERMEABLE BASE (ATPB), See Note (1)

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS FREQUENCY OF SAMPLING	REMARKS
AGGREGATE	Grading	202	25 kg	Materials site, stockpile or plant bins	2 times daily	
	% Crushed Particles	205			As necessary for acceptance	
	LA Rattler (500 Rev.)	211			Once per 4 hours of production	
	Cleanness Value	227			1 for every 5 days paving, for 1st 10 days	Recommend 1 acceptance test per day if 3 consecutive test over 62
	Film Stripping	302				
ASPHALT	In accordance with specifications		1-L can	Test only if no Certification of Compliance	One daily	
COMPLETED MIX	Asphalt Content	310, 362	Two 1-L cans		1 for every 4 hours of production	

CEMENT TREATED PERMEABLE BASE (CTPB)

AGGREGATE	Grading	202	See Note (2)	See Note (3)	Once for each 4 hours of production, See Note (4)	
	LA Rattler (500 Rev.)	211				
	Cleanness Value	227			One for each 4 hours of production, See Note (4)	Recommend 1 acceptance test per day if 3 consecutive test over 80
CEMENT	Various tests		3.5 kg	None with Certificate of Compliance	Once for each 100 tonnes, 2 per day max.	
WATER	Chlorides, Sulfates	405, 422, 417	Clean 2-L plastic jug with lined, sealed lid	At point of use (See REMARKS)	As required for acceptance (See REMARKS)	City water supplies for domestic use need not be tested unless suspected of high chloride or sulfate content. On-the-job wells are to be tested

Note:

(1) See California Test No. 125 for sampling procedures.

(2) 35 kg of 0.30 m No. 19 mm x No. 4. This material for test number 202, 211 and 227.

(3) From material site or stockpile, 60 days prior to use.

(4) Not required if P.C.C from same source is used on other work and test is being made there. No need to duplicate the test just for the sake of record. The actual test results may be used anywhere they are applicable.

Table 6-1.11 MISCELLANEOUS MATERIALS

MISCELLANEOUS MATERIALS, See Note (3)

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS FREQUENCY OF SAMPLING	REMARKS
AGGREGATE BASE	% Crushed Particles	205	45 kg for initial samples, 25 kg for control samples	Materials site or stockpile	As necessary for acceptance	Minimum 1 acceptance test per project
	Sieve Analysis	202			Every 2500 tonnes or 1500 m^3, See Note (1)	
	Durability Index	229			If initial source changes or new source developed	
	R-Value	301			Every 2500 tonnes or 1500 m^3, See Notes (1) (2)	
	Sand Equivalent	217			Every 2500 tonnes or 1500 m^3, See Note (1)	
	Moisture	226			2 times daily if paid for by weight	
	Relative Compaction	216 or 231	15 kg		As necessary for acceptance	
	Dimensions					
AGGREGATE SUBBASE	Sieve Analysis	202	25 kg	Materials site or stockpile	Every 2500 tonnes or 1500 m^3, See Note (1)	Minimum 1 acceptance test per project
	R-Value	301			Every 2500 tonnes or 1500 m^3, See Notes (1) (2)	
	Sand Equivalent	217			Every 2500 tonnes or 1500 m^3, See Note (1)	
	Relative Compaction	216 or 231	15 kg		As necessary for acceptance	
	Dimensions					

Note:

(1) If material is uniform and well within specification limits, the frequency is decreased to 1 per day unless source is changed. Adjustments to testing frequencies shall be documented in the project files.

(2) R-Value testing may be waived when test records demonstrate that material from the same source, and having comparable grading and sand equivalent values, meets the minimum R-Value requirements.

(3) See California Test No. 125 for sampling procedures.

Table 6-1.12 MISCELLANEOUS MATERIALS

MISCELLANEOUS MATERIALS, See note (2)

MATERIAL OR PRODUCT		TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS: LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS: FREQUENCY OF SAMPLING	REMARKS
IMPORTED BORROW		Relative Compaction	216, 231	15 kg		As required for acceptance	
BASEMENT SOIL		R-Value	301	25 kg	Test material below grading plane both in cut and in fill		
		Relative Compaction	216, 231	15 kg		As necessary for acceptance	
		Grade Tolerance					
EMBANKMENT		Relative Compaction	216, 231	15 kg		As necessary for acceptance	
LIME TREATMENT, See Note (1)	SOIL OR AGGREGATE TO BE TREATED	Unconfined Compressive Strength	373	45 kg	Native soils, test each type of material to be treated	If initial source changes	To determine appropriate lime content
	COMPLETED MIX	Lime Content	338	10 kg		As necessary for acceptance	
		Relative Compaction	216, 231			In place after compaction	
		Dimensions					
	LIME	Various Properties		2-L can with friction lid	None with Certificate of Compliance	Each load delivered	
	EMULSION (CURING SEAL)	Various Properties		2-L plastic jug	None with Certificate of Compliance. If no Certificate of Compliance, then from storage tank of distributor truck	Each shipment	

Note:

(1) Not to be used for the lime treatment of AC aggregates.

(2) See California Test No. 125 for sampling procedures.

Table 6-1.13 MISCELLANEOUS MATERIALS

MISCELLANEOUS MATERIALS, See Note (2)

MATERIAL OR PRODUCT		TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS FREQUENCY OF SAMPLING	REMARKS
PENETRATION TREATMENT	LIQUID ASPHALT	Various Properties		1-l CAN	None with Certificate of Compliance	Each shipment	
	SAND	Sieve Analysis	202	2.5 kg	Materials site or stockpile	As necessary for acceptance	
BITUMINOUS SEALS	PAVING ASPHALT	Various Properties		Asphalt 1-L can, Emulsion 2-L plastic jug	None with Certificate of Compliance	Each shipment	
	LIQUID ASPHALT, ASPHALTIC EMULSION	Binder Distribution	339				
	SCREENINGS	LA Rattler	211	25 kg	Stockpile	As necessary for acceptance	
		% Crushed Particles	205				
		Sieve Analysis	202, 105			Twice daily	
		Film Stripping	302			As necessary for acceptance	
		Cleanness Value	227			Once daily	
	SLURRY SEAL AGGREGATE	Sand Equivalent	217	12.5 kg	Stockpile	As necessary for acceptance	
		Sieve Analysis	202				
		Film Stripping	302				
		Durability Index	229				
SOLID OR SEMI SOLID AIR REFINED ASPHALT		In accordance with Standard Specifications		1.5 kg	Barrels or sacks	Each 29 barrels or sacks	
PERMEABLE MATERIAL		Sieve Analysis	202	70 KG	Stockpile	1 daily or as required for acceptance	
		Durability Index	229			If initial source changes or new source developed	
		Sand Equivalent	217			1 daily or as required for acceptance	

Table 6-1.13 MISCELLANEOUS MATERIALS cont.

STRUCTURE BACKFILL	Sieve Analysis	202	25 KG	Materials site	As required for acceptance	
	Sand Equivalent	217				
	Relative Compaction	216 or 231				
SLOPE PROTECTION	Size			Quarry	As required for acceptance (See REMARKS)	Adequate size of slope protection documented by measuring or weighing the material
	Apparent Specific Gravity	206				
	Absorption	206				
	Durability Index	229	35 kg			
ASBESTOS SHEET PACKING			300 x 300 mm		1 each lot	Sample and test if not previously inspected at the source
ASPHALT PLANK			Contact METS for instructions		Contact METS for instructions	Sample and test if not previously inspected at the source
BARBED WIRE			1 m length		Each 50 rolls or fraction	Sample and test if not previously inspected at the source. If less than 150 m of fence, See Note (1)
BOLTS AND HARDWARE			2 samples each diameter		Each lot	Sample and test if not previously inspected at the source

Note:

(1) Resident engineer may accept on the basis of visual examination provided the source has recently furnished similar material found to be satisfactory under the normal sampling and testing procedures of the Department. Place resident engineer's written approval in the project file.

(2) See California Test No. 125 for sampling procedures.

Table 6-1.14 MISCELLANEOUS MATERIALS

MISCELLANEOUS MATERIALS

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS FREQUENCY OF SAMPLING	REMARKS
BRICK	Compliance with specifications		10 full size		Contact METS for instructions	
CHAIN LINK FENCING			0.6 m width		Each 50 rolls or fraction	Sample and test if not previously inspected a source. If less than 105 M of fence, See note (1)
CONCRETE AND CLAY PIPE			Contact METS for instructions		Contact METS for instructions	Sample and test if not previously inspected a source. If less than 30 M of fence, See note (1)
JOINT FILLER EXPANSION			150 mm long full width of sheet		Each 100 m^2 not less than 2 per shipment	Sample and test if not previously inspected a source. If less than 10 M^5 of fence, See note (1)
ELECTRICAL CONDUCTOR			2 each 75 mm long, include markings		Each type each lot	Sample and test if not previously inspected at source. Certificate of Compliance required for 5000 V cable.
GALVANIZED PIPE			300 mm length from each end of length tested of each size		Each 500 lengths or fraction	Sample and test if not previously inspected at the source
GEO-SYNTHETICS FILTER, REINFORCED & PAVING FABRIC S/R FENCE, ETC.			1 piece, 1 m x full width of roll		Each lot	Certificate of Compliance required for each lot. Unroll at least 1 circumference before sampling.
JOINT SEAL, TYPE B			Contact METS			Sample and test if not previously inspected at the source
JOINT SEALING COMPOUND 2-COMPONENT POLYSULFIDE POLYURETHANE			1-L of each component		1 sample from each component of each batch	
MOPPING ASPHALT			1-L		Each lot	

Table 6-1.14 MISCELLANEOUS MATERIALS cont.

PAINT	Compliance with specifications		For bridge or major structure, send an unopened 20-L can. For miscellaneous pointing, 1-L (see Section 6-2 in this manual)		Each batch	Unused portion of 20-L sample will be returned to job. See Section 6-2 in this manual. If less than 75-L, See Note (1).
PAVEMENT MARKERS			20 Markers		1 sample (20 markers) from each lot of 10,000	Sample and test if not previously inspected at the source
PLASTIC CONDUIT			50 mm long from center of length		2 samples each size	
RAISED BARS (PRECAST)			1 unit or full size bar		Each lot	
REINFORCING STEEL			2 samples 0.75m except 1m or #14 & #18		As necessary for acceptance	Sample and test a job site
STEEL PRODUCTS			Contact METS for instructions		Contact METS for instructions	Sample and test if not previously inspected at the source
STRUCTURAL STEEL AND MISCELLANEOUS IRON AND STEEL			2 samples, 0.75 m cut parallel to direction of rolling		Each heat or melt or 10 tonnes or fraction	
WATER-PROOFING MATERIALS		ASTM D173	1 m^2 of asphalt saturated cotton fabric		1 sample from each lot	Meshes of fabric shall be substantially open
		ASTM D449	2.5 kg of asphalt			Contractor's stock must be kept covered
		ASTM D41	1-L of asphalt primer			
WIRE MESH REINFORCING			1 m^2		Each 10 tonnes or fraction	
WIRE ROPE OR CABLE			Per special provisions or as instructed		Per special provisions or as instructed, at time of use	

Note:

(1) Resident engineer may accept on the basis of visual examination provided the source has recently furnished similar material found to be satisfactory under the normal sampling and testing procedures of the Department. Place resident engineer's written approval in the project file.

Section 2 Acceptance of Manufactured Material and Sampling Methods

6-201 General

6-202 Responsibilities and Procedures for Acceptance of Materials

6-202A The Contractor
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6-202E (1) Bituminous Materials
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6-202E (3) Two-component Joint Sealing Compounds
6-202E (4) Portland Cement
6-202E (5) Reinforcement
6-202E (6) Signing and Delineation Materials
6-202E (7) Required Attachments for Acceptance
Table 6-2.1 Materials Accepted by Resident Engineer

6-203 Materials Manufactured to Caltrans-specified Formulation

6-203A Paint
6-203B Concrete Curing Compounds
6-203C Epoxy
6-203D Unprocessed Soils and Aggregates
6-203D (1) Stone from Ledges and Quarries
6-203D (2) Material Sites of Sand, Gravel, or Soil
6-203E Processed Aggregates
Table 6-2.1 Inspection of Fabricated and Manufactured Materials

Section 2 Acceptance of Manufactured Material and Sampling Methods

Section 2 Acceptance of Manufactured Material and Sampling Methods

6-201 General

6-201 General

This section describes Caltrans procedures for acceptance of manufactured material. This section also describes the types of materials that are considered "manufactured material" and the guidelines for sampling these materials.

6-202 Responsibilities and Procedures for Acceptance of Materials

6-202 Responsibilities and Procedures for Acceptance of Materials

The following describes the responsibilities and procedures for acceptance of materials:

6-202A The Contractor

The contractor must provide sufficient advance notification to the resident engineer on source and location of materials to be tested so that the work will not be delayed. As required in Section 6, "Control of Materials," of the *Standard Specifications*, the contractor must list all sources of materials and the location at which these materials are available for inspection on Form CEM-3101, "Notice of Materials to Be Used," prior to being used on the project.

Before use for Caltrans projects, plant scales and meters must have a current certification. For additional details, see Section 3-903E, "Weighing and Metering Procedures," of the *Construction Manual* (manual).

Aggregate sources must comply with the Surface Mining and Reclamation Act of 1975 (SMARA). Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. This list can be obtained from the Division of Construction or at the Department of Conservation's web site at http://www.consrv.ca.gov/omr/SMARA/3098-list. Refer to Chapter 7, "Environmental," of this manual for further information on SMARA requirements.

Specifications for welded products usually require the fabricator to have an acceptable welding quality control plan prior to manufacturing any products for Caltrans. For details on welding quality control plans refer to the Section 180, "Welding," of the Bridge *Construction Records and Procedures Manual*, Volume II.

6-202B Office of Materials Engineering and Testing Services

The Office of Materials Engineering and Testing Services (METS) assigns personnel for inspection of materials at the source of supply. This includes all materials listed in Table 6-2.1, "Materials Accepted by Resident Engineer" at the end of this section.

METS assigns the responsibility for making the inspection based on information contained on Form CEM-3101. Offices in Sacramento, the San Francisco Bay Area, or Los Angeles conduct most of the inspections. However, METS may assign the inspection to the district materials engineer, the resident engineer, or a commercial laboratory.

6-202B (1) Source Inspection

METS must receive all necessary information for source inspection. Forward all copies of approved shop drawings without established distributions (for example, buildings or other small structures) as well as notification of approvals (such as paint color) or changes in the work (such as design changes or contract change orders) to METS. METS should receive copies of all correspondence with contractors or suppliers that may affect fabrication or manufacture.

Inspection by METS includes sampling and testing as necessary to ensure compliance with test requirements and dimensional requirements. Complex fabrication, as in the case of precast, prestressed concrete members and structural steel, also require inspection during fabrication. Inspected materials meeting specifications are identified with a lot number. The METS inspector enters the lot number, a description and the quantities of materials inspected on Form TL-0029, "Report of Inspection of Material."

6-202B (2) Assignment to a Unit of METS or a District Materials Laboratory

After receiving the Form CEM-3101 from the resident engineer, METS indicates on the Form CEM-3101 the items in need of inspection and assigns the inspection to the appropriate inspection office. The responsible inspection office then prepares Form TL-0608, "Notice of Materials to be Furnished," and sends it to the contractor or supplier and the resident engineer.

Subsequently, the inspection office inspects the material, and if acceptable, identifies it with Form TL-0624, "Inspection Release Tag." If the material does not comply, METS or the district materials laboratory will send a "non-conformance report" to the resident engineer.

For acceptable material, a completed copy of Form TL-0029 is sent to the resident engineer.

The resident engineer does not normally receive this report until after the materials have arrived at the job site, but it should be checked against the identifying information that was attached to, or marked on, the materials.

The resident engineer must inform the assigned inspection office if the Form TL-0029 is not received within 15 days after receipt of materials or if there are discrepancies so the necessary investigation can be made.

6-202B (3) Form TL-0624, "Inspection Release Tag."

Materials covered by a Form TL-0624, "Inspection Release Tag," should arrive at the job site properly identified. Form TL-0624 shows the identifying lot number, the inspector's initials, and the date of inspection. If the item is one that does not lend itself to the attaching of tags, such as reinforced concrete pipe, the inspector marks the lot number on each separate piece. In some instances, when there is a possibility of losing tags, the inspector both attaches tags and marks a lot number on the pieces. Timber products typically are stamped with a brand on each piece, usually at the end where it can be seen. (Caltrans inspectors use a stamp with the letters CHC or CT. Commercial laboratories use their own identifying initials or symbols.)

Laboratory inspectors will not necessarily tag every bundle or piece in a shipment (with the exception of timber and reinforced concrete pipe). However, the inspector must attach enough tags on a load to give reasonable assurance that the tags represent the entire shipment.

When manufactured products arrive on the project, the attached Forms TL-0624 authorize the resident engineer to permit use of the materials. However, inspect the materials for damage during shipping or storage, general workmanship, and conformance to planned shape or dimensions.

The METS inspector (or the district laboratory inspector) collects the required certificates of compliance for materials inspected at the source.

6-202B (4) Assignment to a Commercial Laboratory

Commercial laboratories perform most out-of-state inspections. This requires an agreement between METS and the commercial laboratory.

METS authorizes out-of-state inspections only for critical fabricated and manufactured materials and where, in the opinion of the resident engineer and METS, it is in Caltrans' best interest to do so. METS assigns inspection to commercial laboratories.

The assigned laboratory inspects, identifies and tags the material. A commercial laboratory does not use Form TL-0029. They do make a report, usually in letter form, and submit this to METS. METS forwards a copy to the resident engineer.

Materials covered by a letter from a commercial laboratory must arrive at the job site properly identified.

6-202B (5) Assignment to the Resident Engineer.

METS may assign inspection of products for which they normally have responsibility back to the resident engineer. The resident engineer will release these materials at the jobsite using Form CEM-4102, "Material Inspected and Released on Job." See Section 6-3, "Field Tests," of this manual for details. METS assigns inspection responsibility to the resident engineer using Form TL-0028, "Notice of Materials to be Inspected."

After being assigned inspection responsibility, the resident engineer may accept material on the basis of required certificates of compliance or sampling and testing and visual inspection.

When material will be accepted and released at the job site by use of a Certificate of Compliance, the required certificates of compliance should accompany the material to the job site and be retained in the project files. Sampling of material is in accordance with the data shown in the tables at the end of section 6-1, "Sample Types and Frequencies," of this manual.

The resident engineer should inform the contractor that the material will be sampled and inspected on the job and that sufficient time must be allowed to complete any necessary testing before the material can be used.

6-202C The District

The responsibility for training and certifying materials testers rests with the district materials engineer.

6-202D The Resident Engineer

The resident engineer must ensure that only sampled, tested and inspected materials meeting the contract requirements enter the work. The resident engineer must also ensure production facilities, such as asphalt plants and concrete plants, meet specifications. Request the assistance of the district weights and measure coordinator for inspecting asphalt concrete and portland cement concrete plants as required by the specifications and California Test 109, "Method for Testing of Weighing and Measuring Devices."

The resident engineer must ensure that the contractor submits a Form CEM-3101, "Notice of Materials to Be Used" for all materials that require inspection. If the contractor does not submit a Form CEM-3101 before the preconstruction conference, provide a list of materials that may require listing on the CEM-3101 to the contractor during this conference. If the sources of all material are not known, the contractor may submit a partial list and submit supplements as soon as other sources are known.

A timely, accurate, and complete Form CEM-3101 can prevent future delays and conflicts. The following data must be included:

- The Caltrans contract number and the contract item or items for which the material will be used. If the contractor uses a project number (different from the Caltrans number) it helps to also include this number.
- The name, address and telephone number of the supplier or manufacturer where the material can be inspected.
- If the source of material is out-of-state also include the name, address and telephone number of the contractor or subcontractor placing the order and the order number.

Check the form for the required information. If the Form CEM-3101 is incomplete, require that it is corrected or supplemented before distributing the copies. Send METS a copy promptly. METS will make the required assignments for inspection as noted above under " Office of Materials Engineering and Testing Services." Distribute other copies as required by the district.

On the basis of information contained on the Form CEM-3101, the resident engineer will identify (based on district policy) the appropriate samplers, testers and inspectors. The following is a partial list of those who may need to be notified:

- District or METS staff who will be obtaining samples and performing tests on each material
- District or METS staff who will be obtaining samples for each material accepted on the basis of a Certificate of Compliance (Normally tested by METS)
- The district weights and measures coordinator to inspect or witness California Test 109. The district weights and measures coordinator maintains a list of material plants currently in compliance with California Test 109.

6-202D (1) Inspection Verification

If the material delivered to the job site lacks proper identification, or the report of inspection is unconfirmed, or the acceptability of the material is questionable, do not allow materials to be incorporated in the work until they have been found to comply with the specifications. Contact the assigned inspection unit to verify testing or submit samples for new acceptance tests. The exception is sampling of paint. Paint must be sampled at the job site even if there is evidence of previous inspection.

6-202D (2) Source Inspection

The resident engineer and METS share the responsibility for inspection of materials at the source. However, the resident engineer has the sole responsibility for acceptance of material. For example:

- The material may be damaged in shipment or installation.

- It is not always practical for METS to make a 100% piece-by-piece inspection. The inspection is usually random sampling. The resident engineer or assistant resident engineer should check for visually detectable defects or damage.
- There are other situations over which the METS inspector has little control. For example:

  1. A given size of metal culvert pipe may vary in required thickness at various locations with different fill heights. METS inspectors cannot guarantee that a given piece of pipe will be placed at the proper location. They can only check the pipe for specified markings and determine that the measurement is within tolerance for the indicated thickness.
  2. Fit of band couplers should also be checked at the job site.
  3. Some contracts require special wall thickness of reinforced concrete pipe at certain locations, the pipe may be furnished from several plants, and the METS inspector would not know the specific job site location of that particular pipe. The inspector can only determine that it fits one of the types specified.
  4. Another situation not controllable by inspection at the source is the transfer of materials from one contract to another. The inspector can confirm (by a copy of the original inspection report) that a given amount of material with a given lot number was inspected for the first contract. Identifying the material as that received on the first job under the original inspection report and monitoring its transfer from one job to another are responsibilities of the resident engineers involved.

     Such transfers should not be allowed unless the material is positively identified or is of a type (such as fencing or reinforcing steel) that can be resampled and retested in the event identification is lost or is questionable.
- The specifications may be difficult to interpret or the inspector is not aware of a contract change order.

The tables at the end of this section list products that are usually inspected at the site of manufacture or fabrication and indicate items that are checked by the inspector at the source and those which must be checked or rechecked at the job site. The table does not cover every item but provides typical examples.

6-202E Materials Accepted on the Basis of a "Certificate of Compliance"

In accordance with Section 6-1.07, "Certificates of Compliance," of the *Standard Specifications*, the engineer may permit the use of certain materials before sampling and testing if accompanied by a Certificate of Compliance.

Certificates of compliance are used for products for which the industry has demonstrated a high degree of reliability in meeting specifications. METS is responsible for monitoring these industries. METS notifies districts when material from any producer is not acceptable on the basis of a Certificate of Compliance. The district must notify affected contractors. Certificates of compliance must contain the following information:

- Name of mill and company.
- Date of shipment.
- Quantity shipped.

- Serial number traceable to a specific silo, bin or lot.
- A statement naming the applicable type and brand, and that the materials meet the requirements of the *Standard Specifications*, the special provisions, or both.
- Contract number.
- Signature of responsible officer of the company.

When material delivered with a Certificate of Compliance is improperly certified, or any part of it is found not to comply with specifications, reject the entire shipment and notify METS immediately. Procedures for sampling and testing materials accepted by certification vary depending on the material. Following are some details covering the sampling of materials that are accepted by certification.

6-202E (1) Bituminous Materials

When asphalt arrives at the job site or at the plant accompanied by a Certificate of Compliance, the resident engineer to may accept the shipment for use before sampling and testing.

All samples of asphalt, along with the necessary forms and tickets, are sent to Engineering Services, Office of Materials Engineering and Testing Services, 5900 Folsom Boulevard, Sacramento, California 95819. Ship sample cans, two at a time, in the cardboard cartons used for shipping samples of the completed mix. Take samples in the amount and frequency show in the tables in Section 6-1, "Sample Types and Frequencies," of this manual.

Sample asphalts in accordance with California Test 125, "Methods for Sampling Highway Materials and Products Used in the Roadway Structural Sections." Review the safety and health portion of California Test 125 before sampling asphalts.

After obtaining a sample from a plant storage tank, write the shipment number on Form TL-0101, "Sample Identification Card."

METS sends test results to the district materials engineer and to the resident engineer.

6-202E (2) Asphalt Rubber Latex Joint Filler

Submit samples in one-liter friction top cans. Sample after the contents of the drum have been stirred thoroughly and brought to a uniform consistency and before the setting powder has been added.

Note the batch number and the shipment number on Form TL-0101.

6-202E (3) Two-component Joint Sealing Compounds

This material is usually in 10-liter pails. Each pail requires a manufacturer's lot number. Before sampling, stir thoroughly. Samples should be taken in the amount and frequency show in the tables in Section 6-1, "Sample Types and Frequencies," of this manual.

6-202E (4) Portland Cement

For cement delivered directly to the work by the manufacturer, require one Certificate of Compliance for each shipment.

A single certificate for each brand may certify the cement used in ready-mixed concrete by the vendor of the concrete, to cover all deliveries in a single day. It must show:

- The name or brand of cement,
- Mill source
- The total number of cubic meters of concrete delivered under the certificate
- A complete list of individual deliveries identified by delivery slip number or other suitable identification.

A single certificate may cover all deliveries of precast products in a single lot. It must show the name or brand of cement and the length of each size of pipe or the number of precast units of other types represented.

METS inspects precast products, including pipe, made at a plant other than that of the contractors at the jobsite. When such inspection is complete, the resident engineer is relieved of responsibility for obtaining certificates of compliance and sampling of cement. The inspector at the precast product plant will handle cement inspection approximately as outlined for ready-mixed concrete.

Certificates of compliance for cement are inspected and filed by the resident engineer. In the event of a cement test failure, forward copies of certificates to METS.

Sample cement in accordance with the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual and in accordance with California Test 125, "Sampling Highway Materials and Products Used in the Roadway Structural Sections."

Where plant facilities include a cement auger, the cement samples may be obtained by a pipe-sleeve sampling device or by any other convenient method.

A full 3.5-kg is sampled at one time, not in smaller increments. Close the bag immediately, leaving room for the cement to shift. Place the sealed bag in a second plastic bag with the white copy of Form TL-0518, "Job Cement Samples Record." The Form TL-0518 should show the Certificate of Compliance serial number, cement brand and type, name of mill or vendor, date, time sampled, and contract number.

Box the cement samples, after identification, in corrugated cartons (designed to hold single 3.5 kg samples) or in concrete cylinder cartons, which will hold six samples. Ship no more than six samples in any one container.

Mark the shipping carton "Cement Sample," and ship it to METS.

Test reports of portland cement are issued by METS. Acceptability of current shipments from the mill will be shown on the report, but the reports may not actually include results of samples taken from a specific project. The test reports, however, are applicable to each contract identified on a test report. When a project has special requirements for cement, or if there are other non-routine conditions, submit special samples with instructions that they be tested and reported for the specific project.

6-202E (5) Reinforcement

See Section 4-52, "Reinforcement", of this manual for details.

6-202E (6) Signing and Delineation Materials

The Certificate of Compliance must be as specified in the special provisions for prequalified and tested signing and delineation materials.

After obtaining written confirmation of product approval from the district traffic engineer, the resident engineer may accept a substitute signing or delineation material or product without a Certificate of Compliance.

6-202E (7) Required Attachments for Acceptance

The materials listed in Table 6-2.1, "Materials Accepted by Resident Engineer," may arrive on the job site without inspection and Form TL-0029, "Report of Inspection of Material." If required by the *Standard Specifications* or the special provisions, ensure that these materials have a Certificate of Compliance. The table is divided into two parts:

1. Materials that can be accepted solely on the basis of a Certificate of Compliance and
2. Materials that require a test report from the manufacturer or supplier along with the Certificate of Compliance.

Table 6-2.1 Materials Accepted by Resident Engineer

Accept on Certificate of Compliance Only	Accept on Certificate of Compliance and Additional Back-Up*
Asbestos cement pipe	Barbed wire
Asbestos sheet packing	Chain-link fencing and railing
Brick	Crash cushions
Cast iron pipe	Crop inlet grates and frames
Cast iron manhole rings and covers	Fence posts
Ceramic tile	Guard rail
Clay products, manufactured	Open steel flooring and grating
Copper pipe	Precast concrete manhole sections
Culvert markers	Steel sheet piling
Drain tile	Timber products (treated and untreated)
Drip irrigation line	Welded wire fabric
Electrical conductor	Wire mesh fencing
Electrical conduit (galvanized and plastic)	
Electrical pull boxes (concrete and plastic)	
Electrical service cabinets	
Expansion joint filler	
Gates	
Glass beads	
Guide markers	
Plastic pipe	
Precast raised traffic bars	
Reinforcing steel	
Sheet metal	
Slotted edge drain	
Snow poles	
Irrigation hose	
Styrofoam filler	
Waterproofing fabric	
Waterstop	

*Additional back-up documentation such as mill test reports for steel, pressure treating reports for timber, and concrete test reports that show the materials comply to specifications.

6-203 Materials Manufactured to Caltrans-Specified Formulation

6-203 Materials Manufactured to Caltrans-Specified Formulation

The *Standard Specifications* require that certain products be manufactured to Caltrans specifications. The most common of these are paint, curing compounds for portland cement concrete, and epoxy.

6-203A Paint

Paint manufactured under Caltrans specifications is sampled at the factory, tested by METS and identified by lot numbers before shipment is made to the project.

After paint is inspected and identified by METS, sample all paint in the field and send the samples to the laboratory for testing in accordance with the frequency shown in Section 6-1, "Sample Types and Frequencies," of this manual.

For bridges and other major structures, do not allow the paint to be used until the test results of field samples are available. For other miscellaneous painting, properly inspected and identified paint may be used pending test results.

Send samples of paint from the field to the laboratory as soon as the paint is received on the project. This is to determine if the paint has degraded since METS inspected it. During the progress of the job, take special check samples when the paint exhibits hard settling, if the resident engineer suspects tampering with the paint, or at any other time at the discretion of the resident engineer.

Proper sampling to obtain a representative portion of the paint is absolutely mandatory. Use the following sampling methods:

- For bridges and other major structures, or whenever large quantities are involved, send an unopened 20-L can to METS. METS will return unused portions to the job.
- For smaller samples:
  1. Pour the top liquid into a clean container as large as the one being sampled.
  2. Stir the settled portion of the paint with a paddle, gradually reincorporating the decanted liquid a little at a time until all has been added.
  3. "Box" the paint by pouring it back and forth between the two containers at least five or six times or until the paint is mixed thoroughly.
  4. Take a liter sample immediately.

Send all samples to the laboratory promptly, along with all pertinent information regarding them. Use Form TL-0101, "Sample Identification Card."

When the paint is state-furnished, check samples will not be required.

6-203B Concrete Curing Compounds

Concrete curing compounds are generally of two types, petroleum hydrocarbon resin base or water base. Curing compounds are normally sampled at the factory, tested by METS, and identified by lot numbers before they are shipped to the project.

METS does not routinely inspect the petroleum hydrocarbon resin base concrete curing compound at the source. It may be accepted for use if it is packaged and labeled as specified. However, sample it for testing in accordance with the frequency shown in Section 6-1, "Sample Types and Frequencies," of this manual.

In addition to requirements in California Test 125, "Methods for Sampling Highway Materials and Products Used in the Roadway Structural Sections," field samples may be obtained from a valve in the feed or recirculation lines of the sprayer. Samples may be obtained from the spray nozzles if care is used to prevent excessive loss of the solvent by evaporation. Because of the tendency of pigments to settle, all pigmented types must be mixed thoroughly before sampling.

6-203C Epoxy

METS samples epoxy manufactured under Caltrans specifications at the factory, tests and identifies it by lot numbers before it is shipped to the project. The Certificate of Compliance required for epoxy certifies compliance with packaging and labeling laws, not quality of material. The source inspector normally obtains the certificate, and it does not need to accompany the material to the job site.

Normally, it is not necessary to sample epoxy in the field if the material has been inspected at the source and is identified properly.

Occasionally, specified composition of the above materials is changed. The newer specification results in an equal or better product, or an acceptable replacement for a product is no longer available. Materials manufactured under specifications newer than those that apply to a particular project are acceptable for use. METS inspectors release such materials, and resident engineers may permit use of such materials without contract change orders unless specifically advised to the contrary. This applies only to the items of paint and epoxy identified properly by Caltrans specification numbers. Current specification numbers are listed in the special provisions.

6-203D Unprocessed Soils and Aggregates

The following discussion is primarily applicable to initial sampling and sampling performed for reasons other than specification compliance although the same precautions apply when sampling for specification compliance.

6-203D (1) Stone from Ledges and Quarries

Inspect the ledge or quarry face to determine any variations in different strata, and in different portions of the ledge. Observe and record differences in color and structure. Obtain separate samples of unweathered stone from all strata that appear to vary in color and structure.

6-203D (2) Material Sites of Sand, Gravel, or Soil

Select samples representing the different materials that are available in the deposit. If the deposit is worked as an open face or pit, take the samples by channeling the face so that they will represent material that visual inspection indicates may be used. It is necessary, especially in small deposits, to excavate test holes some distance back of, and parallel to, the face to determine the extent of the supply. The number and depth of these test holes depend on the quantity of material to be used from the deposit. Obtain samples from open test pits by channeling a face of the test pit in the same manner as sampling a face of a materials site, described above. Do not include in the sample material that will be stripped from the pit as overburden. Obtain separate samples from the face of the bank and from the test holes. If visual inspection indicates that there is considerable variation in the material, obtain separate samples at different depths.

Sample deposits that have no open faces by means of test holes. When sampling material sites, select depth and spacing of test holes considering the probable method of operating the pit. In general, dozers will combine the material laterally. A shovel will remove the material vertically. Test results in a “spotty” pit may be misleading to the extent that operations may be too expensive in order to make the required grading.

If at all possible, use a dozer or shovel to open up the pit before sampling rather than depending on test holes.

6-203E Processed Aggregates

Sample processed aggregates, from locations such as stockpiles, transportation units, conveyors, or windrows in accordance with California Test 125, “Sampling Highway Materials and Products Used in the Roadway Structural Sections.”

Section 3 Field Tests

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6-304 Field Testing Equipment

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Section 3 Field Tests

Section 3
Field Tests

6-301 General

6-301
General

The resident engineer must ensure that materials incorporated into the project comply with specifications. See Section 3-507, "Inspection," and Section 3-608, "Testing," of the *Construction Manual* (manual).

Perform field inspection of material and testing in accordance with the guidelines in this chapter. Maintain a record of field tests and material inspected and released on the job as described in Section 5-102, "Organization of Project Documents" of this manual.

6-302 Field Inspection and Release of Materials

6-302
Field Inspection and
Release of Materials

If any materials listed in Table 6-2.1, "Materials Accepted by Resident Engineer," arrive on the job site use the following procedure:

- When required by the specifications, ensure that the material has a Certificate of Compliance from the supplier stating that the material meets all required specifications for the contract.
- Ensure that the appropriate documentation is included for materials covered by the Buy America requirements.
- Complete Form CEM-4102, "Material Inspected and Released on Job."

6-303 Field Laboratory

6-303
Field Laboratory

Suitable laboratories and equipment are necessary to perform proper field testing. When economically feasible, a field laboratory should be established for a number of construction projects in the immediate area.

Most laboratories have water, gas, and electricity. Field laboratory facilities are provided by any of the methods covered under Sections 1-4, "Facilities and Equipment," and 1-5, "Field Expenses and Purchases," of this manual.

The resident engineer should coordinate with the district materials engineer to establish a field laboratory.

6-304 Field Testing Equipment

6-304
Field Testing
Equipment

Each district materials engineer must have an effective calibration program for equipment used for construction-control testing. Testing equipment must be in proper operating condition and within prescribed tolerances for accuracy.

Standards for calibration of testing equipment are described in the appropriate California Tests for calibration and manufacturer's instructions.

District materials laboratories perform periodic reconditioning and calibration of field laboratory testing equipment. The use of decals attached to testing equipment showing date of last calibration, name of calibrator, the district, and date that the next calibration is due, is a requirement for all testing items listed below. Decals are available from the district warehouse (Stock Number 7690-0040-3).

Acceptance samplers and testers have frequent opportunities to verify that field testing equipment is in good condition and should check the date of last calibration on the decal.

Any testing equipment that does not meet calibration requirements is to be recalibrated or replaced without delay. Each piece of equipment should be recalibrated and reconditioned in accordance with the frequencies listed in the appropriate California Test. More frequent calibration may be required depending on use of equipment and on moving and handling practices.

While the maximum interval between calibrations may be as long as a year, equipment should be calibrated any time there is reason to believe it has been damaged or effected in any way that would affect calibration.

6-304A Scales and Balances

All scales and balances used in field testing must be recalibrated periodically. The district weights and measures coordinator can accomplish this or the district materials engineer can use a service contract to use technicians from private industry to perform the recalibration. Recalibration of this equipment must be performed at least once each year. New scales and balances must be calibrated prior to use.

In the interest of standardization, the following types of scales are recommended for field use:

- A 20-kilogram balance equipped with graduated bars on the beam to give readings under 1,000 grams without recourse to loose weights.
- A 6-kilogram trip scale equipped with agate bearings and double beam. The upper beam should be graduated to 100-gram units, making a range of 1,100 grams directly on the beam without recourse to loose weights. The equipment should include one 1-kilogram and two 2-kilogram weights with scoop and scoop tare, all to provide a full capacity of six kilograms.
- A torsion balance of 500-gram capacity, accurate to 0.10 gram.

When the volume of work is large, an automatic digital scale is advantageous and can be used instead of the 20-kilogram and 6-kilogram scales described above.

6-304B Screens and Sieves

Examine all screens and sieves prior to performing grading tests. Inspection includes examination for broken wires, distortions and sags, and removal of particles stuck in the mesh, all as instructed in California Test 202, “Sieve Analysis of Fine and Coarse Aggregates.” At frequent intervals independent assurance samplers and testers follow up by checking the condition of all screens and sieves available for use on the job.

6-304C Portland Cement Concrete Air Meters

Data sheets accompanying newly purchased meters contain operation and calibration information. Supplemental sheets are available through the Office of Materials Engineering and Testing Services (METS).

California Test 504, “Determining Air Content of Freshly Mixed Concrete by the Pressure Method,” covers the procedure for operation of the two most common brands in use by Caltrans. California Test 115, “Calibration of Pressure Type Air Meters,” covers calibration of these two meters.

6-304D Profilograph
California Test 526, "Operation of California Profilograph and Evaluation of Profiles," includes the operation and calibration of the profilograph in addition to the evaluation of the profilogram.

Information available from the district materials engineer covers profilograph assembly and operating instructions. This information, in conjunction with the test method, should cover all but major problems concerning profilographs.

In the event of major repairs beyond district capability, send the equipment to METS or return it to the manufacturer.

6-304E Compaction Tubes
California Test 110, "Calibration of Compaction Test Equipment," outlines the procedure for both calibration and repair.

6-304F Cement-Treated Base Compressive Strength Apparatus
District materials laboratories can check the calibration of the hydraulic jacks used with the apparatus. Occasionally a jack requires repair, and this should be done at the METS machine shop.

6-305 California Test Methods

6-305 California Test Methods

California Tests include both field tests and laboratory tests. Section 6, "Control of Materials," of the *Standard Specifications* states that, whenever a reference is made in the specifications to a California Test by number, it means the test in effect on the day "Notice to Contractors" for the work is dated. This means that the test methods for each project are fixed and are not necessarily the latest revisions.

Field personnel who perform tests for compliance with the specifications must use the proper test methods for the project involved. The resident engineer must ensure that the correct versions of test methods are used. The latest revisions of the test methods can be obtained from Engineering Services' web page.

Use the following guidelines for some of the California Tests performed in the field.

6-305A Method of Determining Approximate Grading of Mineral Aggregate by Dry Sieve Analysis
California Test 202, "Sieve Analysis of Fine and Coarse Aggregates," requires that fine aggregate is subjected to a prescribed washing procedure before performing the sieve analysis. However, where large numbers of sieve analyses are performed on material from a given source, the tester may use the "Approximate Sieve Analysis of Processed Fine Aggregate" method in Appendix E of California Test 202.

6-305B Fabrication of Cement Treated Base Specimens
Test specimens are fabricated in the field. When compressive strength tests are desired, the specimens are cured, tested in the field, or shipped to the district materials laboratory for testing in accordance with applicable portions of California Test 312, "Designing and Testing Classes 'A' and 'B' Cement Treated Bases."

6-305C Determination of Cement or Lime Content
See California Test 338, "Determination of Cement or Lime Content in Treated Aggregate by the Titration Method," for instructions. The acid base titration and constant neutralization titration tests are used to determine the percentage of portland cement or lime in aggregates that have been treated.

The resident engineer must devise and carry through a cement-determination test program geared to the contractor's mixing and spreading operation. Increase testing frequency when mixing or spreading equipment is changed or altered or production rates are increased.

6-305D Portland Cement Concrete Compressive Strength Tests

Compressive strength samples are taken in accordance with American Society for Testing and Materials (ASTM) C172, "Standard Practice for Sampling Freshly Mixed Concrete."

A test for penetration, in accordance with California Test 533, "Test for Ball Penetration in Fresh Portland Cement Concrete," is made on each batch of concrete from which strength specimens are made.

If air-entrained concrete is used, test the concrete using California Test 504, "Determining Air Content of Freshly Mixed Concrete by the Pressure Method," on each batch of concrete from which strength specimens are made. If concrete contains lightweight aggregate, air content is determined in accordance with ASTM C173, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method."

If the cement content is being checked by California Test 518, "Unit Weight of Fresh Concrete," determine the cement content for each batch from which strength tests are made.

Review California Test 540, "Making, Handling, and Storing Concrete Compressive Test Specimens in the Field," to determine the maximum size of coarse aggregate to be incorporated in the test specimen. Be sure to note removal of any oversize aggregate on the sample identification card.

California Test 540 covers the molding, transportation, curing, and storage of concrete cylinders.

6-305D (1) Number of Cylinders Required for a "Test"

Each compressive strength test of concrete is determined to be the average strength of two cylinders. If the strengths at both 14 and 28 days are required, submit two cylinders for the 14-day test and two cylinders for the 28-day test. METS performs the compressive strength test and reports results to the resident engineer on Form MR-0507, "Portland Cement Concrete Test Report." The resident engineer evaluates the test results.

The "2 cylinders = 1 test" concept applies to all concrete cylinder tests except trial batches.

6-305D (2) Trial Batches

Specifications state that for specified-strength concrete, the concrete must be prequalified by trial batches before it is placed.

Make and test cylinders to prequalify the concrete. The test results must meet the contract specifications before the specified-strength concrete may be considered as prequalified.

Concrete for trial batches must be designed, produced, and tested by the contractor (or its supplier), and a certified trial batch test report must be obtained prior to use of such concrete. The resident engineer must ensure that the certified trial batch test report contains all of the specified data.

The resident engineer must determine whether testing of trial batches will be performed during the life of the contract. Caltrans personnel must witness trial batch testing.

6-305D (3) Identification of Test Cylinders

For compressive strength tests, use Form TL-0502, "Field Sample of Portland Cement Concrete Sample Card." The card must be complete. Do not leave any blank spaces. Designation of the type of concrete must be included (such as Class 1 or 25 MPa).

Source of aggregates should indicate the deposit from which the aggregates were obtained, such as "Kaiser-Radum", or "Chevreaux-Bear River", and not the batch plant. The aggregate source must be in compliance with the Surface Mining and Reclamation Act of 1975. Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. Write the SMARA Eligible List number on Form TL-0502. You can obtain this list from the Division of Construction or the Department of Conservation's web site at:
http://www.consrv.ca.gov/omr/SMARA/3098-list

In the space for "water-weight per sack," indicate the total weight of water used per sack of cement in the mix based on actual weights (not design weights). On the last blank line of the concrete information box indicate the specified concrete strength or class if any. Otherwise mark the space with a line. Under "remarks" indicate if the unit weight of the hardened concrete cylinder(s) is required. The laboratory will not furnish unit weight data unless it is specifically requested. Make out a sample card for each pair of cylinders shipped in the same carton.

A uniform system of marking cylinders is used. This system consists of the contract number and the sample number. The sample number consists of a series of digits separated by dashes (-) to indicate: method of storage for curing, age at which cylinder(s) are to be tested, the cylinder number of the pair, or the group of 5, which is to be tested, and job coding. Use a flow pen to mark each sample can. Examples of this marking system follows:

Example 6-3.1 Sample Cylinder Label

Contract No.	03-100844
Sample No.	1-28-1/5_ _ _ _ _ _
Date Cast	_____

In the sample number shown above, the first digit indicates method 1 storage for curing; use only one digit for this designation. The second group of two digits indicates that the cylinder is to be tested at 28 days; use two digits for the test age. The third 1/5 symbol indicates that it is the No. 1 cylinder of a 5-cylinder trial batch sample; the No. 2 cylinder would be marked 2/5, and so on. If only one sample card was made for two cylinders, the third symbol on the card would be 1,2/5. The last four spaces are reserved for any desired job coding consisting of numbers, letters, or a combination of both.

Example 6-3.2 Sample Cylinder Label

Contract No.	03-100844
Sample No.	2-14-2/2 _ _ _ _ _
Date Cast	_____

In this example the first digit indicates method 2 storage for curing. The second group of two digits indicates that the cylinder is to be tested at 14 days. The third 2/

2 symbol indicates that it is the No. 2 cylinder of a 2-cylinder test group. Again, if only one sample card is made for the two cylinders, the third symbol on the card would be 1,2/2. The last four spaces represent any desired job coding consisting of numbers, letters, or a combination of both.

6-305D (4) Shipping

Cylinders are shipped to the laboratory in accordance with the provisions of California Test 540, "Making, Handling, and Storing Concrete Compressive Test Specimens in the Field." Cylinders are shipped without removing the mold and are packed in cardboard containers that are available from district warehouse. Each carton holds two cylinders.

If the district transportation laboratory is equipped to test concrete cylinders they should be sent there. Otherwise cylinders may be shipped or delivered either to METS in Sacramento or Los Angeles, whichever is more convenient. Cylinders are not to be shipped cash on deliver to METS. Do not accumulate test cylinders at the job site. Ship them within the time limit specified in California Test 540.

6-305E Relative Compaction Using Nuclear Gauges

California Tests 231, "Relative Compaction of Untreated/Treated Soils and Aggregates (Area Concept Utilizing Nuclear Gauges)," and 375, "Determining the In-Place Density and Relative Compaction of AC Pavement," set forth the procedures for determination of relative compaction by use of nuclear gauges.

In addition to California Test 231, use of nuclear gauges is contained in California Test 121, "Administrative Instructions For Use of Nuclear Gauges," as well as the manufacturer's manual pertaining to the gauge being used. A copy of these documents must be kept with each gauge. Each operator must report missing documents and arrange for their replacement.

The person responsible for general inspection of the work and the person performing the test measurements, are both involved in performing the complete test. The progressive steps are:

- Designating the test area.
- Selecting test sites within the test area.
- Taking physical measurements.
- Determining test maximum value for comparison with the average in-place density (California Test 231 only)
- Evaluation.

6-305F Determining the Accuracy and Suitability of Scales and Meters used in Materials-Processing Plants

California Test 109, "Test for Weighing and Measuring Devices," is the test method for determining the accuracy and suitability of weighing and measuring devices used to proportion materials in materials producing plants. See Section 3-9, "Measurement and Payment," of this manual for weighing and metering procedures.

The maximum interval for retesting proportioning equipment is as follows:

- Asphalt concrete and portland cement concrete batch plants - 1 year
- Asphalt concrete continuous mixing plants - 6 months
- Slurry seal mixer-spreader trucks - 6 months or when aggregate sources are changed.

The equipment may be tested as often as deemed necessary. The district weights and measures coordinator maintains a list of material plants and equipment currently in compliance with California Test 109.

When witnessing California Test 109, the district weights and measures coordinator must also ensure that the plant meets Cal/OSHA requirements.

Section 1 Environmental Rules and Requirements

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Section 1 Environmental Rules and Requirements

Section 1 Environmental Rules and Requirements

7-101 General

7-101 General

This section provides information and guidelines for administering the various environmental requirements for Caltrans contracts.

The district construction deputy director is responsible for ensuring that environmental and permit requirements are enforced. To meet legal requirements, district construction staff must receive appropriate training, possess appropriate skills, and understand their role in successfully carrying out environmental measures. Within the district construction division, appropriate environmental coordinators must be appointed.

7-102 Sources of Information

7-102 Sources of Information

A variety of sources explain Caltrans' environmental procedures, methods, and commitments. These sources include the *Caltrans Environmental Handbook*, *Caltrans Storm Water Quality Handbooks*, and an Intranet page titled "The Caltrans Intranet for Environmental Planning and Engineering." The construction contract contains environmental requirements in the plans and specifications. In addition, the resident engineer's pending file contains a summary of all project commitments, copies of applicable permits, the environmental document, and other environmental documentation. Some districts produce special publications that detail the environmental requirements for each project. The district's environmental experts are also good sources for information or clarification about environmental commitments. These individuals are always available to explain commitments and lend assistance at the preconstruction conference or at any other time during construction.

7-103 Protection of Environmental Resources

7-103 Protection of Environmental Resources

The following are guidelines for fulfilling the responsibility for protecting and preserving various environmental resources during construction as required by law.

7-103A Archeological and Historical Resources

Mitigating a project's impact on historical and archaeological sites during construction may require the recovery of artifacts. Mitigation may also require Native Americans, archeologists, architects, and historians to monitor and coordinate the recovery process. Normally, archaeological work is done in advance of construction, but occasionally, finds are made during construction. If human remains or previously unknown historic and archaeological artifacts are unearthed, suspend work in the vicinity until the find can be evaluated and properly treated. Procedures and responsibilities are detailed in the *Caltrans Environmental Handbook*.

7-103B Endangered Species

Both state and federal laws are designed to protect designated plant and animal species along with their respective habitats. As a result, often very strict prohibitions exist on certain types of work, work during certain times of the year, or work at specific locations. Even inadvertently impacting protected species can result in fines or jail sentences. The contract will specify the necessary measures and restrictions, and the plans will show environmentally sensitive areas. However, during construction, project crews may discover protected species that were not anticipated in the contract. If such a discovery occurs, suspend work in the area and immediately notify the district environmental unit.

7-103C Migratory Bird Act

The Migratory Bird Act makes it illegal to interfere with migratory birds. Breeding and nesting seasons for these species can result in strict prohibitions or require working around nesting areas. The act may require avoidance or prohibit disturbance of many species of birds, such as swallows that roost or nest under highway structures. Should occupied nests be found, suspend work in the nests' vicinity until the birds abandon the nests.

7-103D Surface Mining and Reclamation Act of 1975

The State Contract Act prohibits Caltrans from buying aggregate materials from sources not exempt or not compliant with the Surface Mining and Reclamation Act of 1975 (SMARA). Mining operations determined to be in compliance are listed on the AB 3098 SMARA eligible list. You can obtain this list from the Division of Construction or the Department of Conservation's web site at http://www.consrv.ca.gov/omr/SMARA/3098-list. Generally, Caltrans cannot accept material from unlisted sites. However, the State Mining and Geology Board may grant one-time exceptions.

To comply with SMARA and the State Contract Act, imported materials from the following sources must be listed on the AB3098 list:

- Materials from mined sources.
- Materials from commercial vendors and suppliers.
- Materials from federally owned lands where an agreement exists between the federal landholding agency and the California Department of Conservation (DOC) that SMARA applies.
- Materials from Native American reservations where an agreement exists between the reservation and the DOC that SMARA applies or a nontribal mine operator is present.

In addition to the specific exemptions listed in SMARA, Caltrans has determined that imported material from the following types of sources comply with SMARA and do not require inclusion on the AB3098 list:

- Imported material from a development or other nonmining source where the material is a byproduct of construction and this source has approval in a local agency plan and through the California Environmental Quality Act.
- Excess material generated from a Caltrans project whose environmental approval appropriately considered the construction phase and met approval requirements for reclamation of the site.
- Materials from failures of natural or man-made slopes within Caltrans' right-of-way as a result of storms, slides, or slipouts.

- Materials from outside the State of California.
- Materials originating from Native American reservations where no agreement exists between the reservation and the DOC that SMARA applies and a tribal mine operator is present.
- Materials from federal land where no agreement exists between the federal landholding agency and the DOC that SMARA applies.

For assistance with resolution, refer any challenges to the acceptance of materials to the construction field coordinator.

7-104 Air, Water, and Noise Pollution Control

7-104 Air, Water, and Noise Pollution Control

This section contains guidelines for administering the contract's air, water, and noise requirements.

7-104A Air Quality

All Caltrans projects must comply with the Clean Air Act. Permits are issued by local air quality management districts and require that the project create no smoke, offensive odors, or visible dust. Contractors must take appropriate measures to ensure their equipment is properly maintained and to apply water and other dust palliatives as frequently as necessary. Violations can result in fines and sanctions against the contractor and Caltrans.

In areas where naturally occurring asbestos has been identified, the specifications will set forth additional requirements to protect workers and the public. In this case, the resident engineer should include consideration of asbestos in the project code of safe practices.

7-104B Water Pollution Control

To ensure the control of pollutants in discharges of storm water runoff, Caltrans projects may be subject to federal law under the Clean Water Act and state law under the Water Code. The regulations require a National Pollutant Discharge Elimination System Permit (storm water permit), issued by the State Water Resources Control Board (SWRCB). The specifications require the contractor to conform to the permit's requirements.

For each construction project, the contractor must prepare a water pollution control program (WPCP) in accordance with Section 7-1.01G, "Water Pollution," of the *Standard Specifications*, *Caltrans Storm Water Quality Handbooks*, and the contract's special provisions. These documents describe the measures the contractor must implement to ensure that construction activities do not pollute the waters of the state. The resident engineer must approve all such preventive measures, and then the contractor's forces must implement and maintain the measures.

Successfully protecting from pollution the state's water resources (rivers, lakes, and streams) is critical to the project's success. These waters must be protected from chemical pollutants and from sediment in storm water runoff. Chemical pollutants include petroleum products, paint residues, and curing compounds. The Division of Environmental Analysis, in conjunction with the Division of Construction, has organized a task force (known as the "storm water task force"), consisting of construction environmental specialists. This task force visits the projects, reviews the contractor's WPCP, and acts as technical advisors to the resident engineer.

7-104B (1) District Construction Storm Water Coordinator Responsibilities

District construction must have a designated construction storm water coordinator who will carry out necessary administrative functions to prevent water pollution. The coordinator will work with other functional areas in the district, assist resident engineers to ensure compliance, and ensure that field construction personnel are appropriately trained.

7-104B (2) Resident Engineer Responsibilities

The resident engineer must use all available assistance and expertise in preventing water pollution. This assistance may come from the construction storm water coordinator, other functional areas in the district (such as the environmental and hydraulics units), or the storm water task force.

Before work begins, the resident engineer must do the following:

- Designate appropriate staff as storm water inspectors to assist in preventing storm water pollution.
- Review the construction contract and the resident engineer's pending file for instructions and commitments.
- Ensure that all proper forms have been filed with the Regional Water Quality Control Board (RWQCB).
- Meet with the appropriate environmental and engineering experts in the district to ensure a full understanding of the contract requirements for water pollution prevention.
- Conduct a preconstruction meeting with the contractor to discuss all required storm water measures and requirements. Depending on the project's size and complexity, this preconstruction conference may be used exclusively for discussing water pollution prevention or the topic may be included in a general preconstruction conference.
- Provide the contractor with a copy of the conceptual storm water pollution prevention plan (SWPPP) if one has been prepared, by the district design unit, for the project.
- Review and approve the contractor's SWPPP or WPCP as required by the specifications. The construction storm water coordinator and the storm water task force may assist in the review. Note that before the resident engineer has accepted the plan, the specifications prohibit any work that has the potential to cause water pollution.
- Before any earthwork begins, direct the contractor to deploy any storm water "best management practices" (BMPs) called for in the SWPPP or WPCP.

During the course of work, the resident engineer must do the following:

- In compliance with the storm water permit, maintain a copy of the SWPPP or WPCP on the project site.
- Inspect the contractor's operations for compliance with the specifications and the approved SWPPP or WPCP, including deployment of BMPs.
- Ensure the contractor adheres to the inspection schedule set forth in the SWPPP or WPCP and provides written reports of these inspections.

- Ensure the contractor maintains BMPs so that they will function as planned.
- Ensure the contractor has the necessary materials on hand to deploy any necessary additional BMPs in the event of a storm.
- Ensure the contractor uses appropriate measures to stabilize slopes at the times specified.
- In accordance with the specifications, ensure the contractor submits an implementation schedule for soil stabilization and sediment control for disturbed soil areas.
- Ensure the contractor complies with the provisions that restrict the size of the contractor's disturbed soil area.
- Ensure the contractor notifies the resident engineer and obtains the resident engineer's approval in advance for each first-time nonstorm water discharge, excluding exempted discharges.
- Monitor the contractor's active and nonactive disturbed soil areas. Ensure the contractor conducts soil stabilizing activities as specified.
- Ensure the contractor deploys storm water and nonstorm water BMPs whenever associated construction activities are taking place.
- Direct the contractor to correct any deficiencies in compliance efforts identified as a result of reviewing the contractor's or compliance task force's written reports.
- If any pollutants are discharged into the waters of the state, notify the construction storm water coordinator immediately. Review the storm water permit to determine the appropriate reporting timeframe, and provide a draft report of noncompliance to the construction storm water coordinator. The construction storm water coordinator will then forward the report to the RWQCB.
- Report to the construction storm water coordinator any illegal discharges or connections. Require the contractor to prepare a notice of discharge as specified in the SWPPP.
- If noncompliance occurs, take appropriate contractual sanctions against the contractor based on the nature and severity of the situation. Such sanctions include the following:

  1. Withholding funds from contract payment as specified in the contract.
  2. Suspending any work that would exacerbate the noncompliance or interfere with or prevent the contractor's efforts to correct the deficiency. For example, earthwork operations may be suspended until the contractor controls sediment or stabilizes soil as specified. Other work performed by a crew might be suspended if that crew is needed to install BMPs.
  3. Bringing in a separate contractor to complete the work and billing the contractor or the contractor's bonding company for all costs.
- Meet with personnel from regulatory agencies, such as the United States Environmental Protection Agency (EPA) and the RWQCB, and the storm water task force to discuss storm water issues and measures.
- Ensure the contractor submits an annual certification of compliance as specified. Sign, date, and file this certification in the project records.

Before accepting the contract, the resident engineer must do the following:

- As required by the contract, determine that all slopes are stabilized.
- Require the contractor to remove temporary BMPs such as silt fences or other measures that are not a part of permanent erosion control or that the district maintenance unit has not requested to be left in place.
- Conduct a final walk-through of the project area with the maintenance superintendent or region manager.

Upon acceptance of the contract, file Form CEM-2003, "Notification of Completion of Construction," with the RWQCB.

7-104B (3) Storm Water Inspector's Responsibilities

The resident engineer may assign an assistant resident engineer as the storm water inspector. The storm water inspector will assist the resident engineer in carrying out any or all of the inspection tasks and other work described above, as determined by the resident engineer. Typically, the storm water inspector will do the following:

- Review and become familiar with the *Standard Specifications* and special provisions pertaining to water pollution control.
- Review and become familiar with the approved WPCP or SWPPP.
- Conduct site inspections. Verify that BMPs are properly installed and meet the requirements in the *Caltrans Storm Water Quality Handbooks* and the contract specifications. Look for areas that may require BMPs that are not deployed or not addressed in the WPCP or SWPPP. Observe and identify any discharges, illicit connections, and illegal discharges. Take photographs of all areas.
- Prepare special daily reports on storm water pollution prevention. Record all storm water management activities, or inactivity, and conversations with the contractor regarding storm water pollution prevention. Record site visits from regulatory agencies, such as the (SWRCB), the RWQCB, or EPA, and any inspections the agencies perform.
- Monitor the weather reports of the National Weather Service for rainfall predictions. If rainfall is predicted, direct the contractor to deploy appropriate BMPs as identified in the SWPPP or the WPCP.
- Inform the resident engineer immediately of any problems with BMPs during the implementation of the WPCP or SWPPP and any observed discharges.
- Identify changes in construction that may require amendments to the WPCP or SWPPP, and notify the resident engineer of these findings.
- For sites covered by permits, ensure site access and the safety of representatives of regulatory agencies and local agencies when they are on site for any reason.

7-104B (4) Contractor's Inspections

The special provisions for water pollution control require the contractor to regularly inspect the construction site for the proper implementation, performance, and maintenance of BMPs identified in the WPCP or SWPPP. The contractor must follow

the site inspection procedure specified in the *Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program Preparation (WPCP) Manual* (plan preparation manual). Trained personnel must conduct the site inspections, using the site inspection checklist, a copy of which must be provided to the resident engineer.

The contractor must notify the resident engineer whenever the SWPPP, WPCP, or BMPs may not reduce or have not reduced the discharge of sediment or other pollutants into a waterway. The contractor must follow the verbal notification with a written report. The contractor's report must conform to the provisions of Section 600.2, "Discharge Reporting," of the plan preparation manual.

If the situation constitutes noncompliance with the permit, the resident engineer must conduct a verification inspection, and if a noncompliance condition exists, report it to the construction storm water coordinator. The construction storm water coordinator will report it to the appropriate RWQCB. The resident engineer must require the contractor to amend the WPCP or the SWPPP, if necessary, to install additional BMPs.

7-104B (5) Amendment Review and Processing

During construction, conditions may occur that affect the ability of the contractor to implement the WPCP or SWPPP as initially approved or the ability of the approved WPCP or SWPPP to meet the objectives for water pollution control. A change in construction operations or site conditions may result in the discharge of significant quantities of pollutants to surface waters or municipal storm drain systems. These changes can include construction staging or schedule changes, staging area modifications, unanticipated offsite drainage impacts, and failures of BMPs. The contractor must amend the WPCP or SWPPP if either of these plan's effectiveness is diminished by any such changed condition. The SWPPP must also be amended if it violates any condition of the permit.

Upon the resident engineer's approval, the contractor must incorporate all WPCP or SWPPP amendments into the on-site documents. The contractor must prepare WPCP amendments in the format prescribed in Section 40, "Amendments," in Section 3 of the plan preparation manual. The contractor must prepare SWPPP amendments in the format prescribed in Section 200, "SWPPP Amendments," in Section 2 of the plan preparation manual. In addition, SWPPP amendments must be entered into an amendment log, as shown in Section 200.2,"Amendment Log," in Section 2 of the plan preparation manual.

The resident engineer must review the contractor's proposed WPCP or SWPPP amendment for completeness and conformance with the revised conditions, and give written approval to the contractor if the amendments are acceptable.

7-104B (6) Project Files

The resident engineer must keep copies of all documents related to storm water pollution prevention in category 20, "Water Pollution Control Plan or Storm Water Pollution Prevention Plan," of the project files. Retain all the required documents for at least three years after contract completion. These documents include the following:

- SWPPP or WPCP and all amendments.
- Daily reports and photographs related to the prevention of storm water pollution.
- The contractor's site-inspection checklists.

- The contractor's reports of discharge.
- All correspondence related to storm water pollution prevention, including notices of noncompliance.
- Inspection reports from the storm water compliance task force.
- Inspection reports from the resident engineer and assistant resident engineer.
- Copies of the certifications required by the specifications.
- Form CEM-2003, "Notification of Completion of Construction."

7-104B (7) Contractor's files

The specifications require the contractor to keep at the project site copies of the SWPPP or WPCP and all approved amendments.

7-104C Noise Control

Construction and traffic noise is often a sensitive issue in neighborhoods and communities adjacent to state highways. Major funding often has to be provided to pay for highway noise reduction through the construction of sound walls and other noise attenuation. Construction contractors are required to have appropriate noise attenuators in good working condition on all equipment. Special restrictions may be employed on night work in sensitive areas, such as residential neighborhoods, schools, or hospitals near the project site.

7-105 Permits

7-105 Permits

This section covers environmental related permits issued by regulatory agencies.

7-105A Special Use Permits

The U.S. Forest Service, Bureau of Land Management, and other federal agencies issue special use permits to Caltrans to construct and operate highway facilities across lands under their jurisdictions. Special use permits often require Caltrans to construct facilities in certain ways to protect the environment.

7-105B Fish and Game Code Sections 1601 and 5650

Section 1601 of the Fish and Game Code requires that public agencies such as Caltrans reach an agreement with the California Department of Fish and Game if the proposed work affects a waterway. The agreement this section of the code requires is known as the "Lake/Streambed Alteration Agreement," also known as the 1601 agreement. Anything showing as a blue line on an U.S. Geological Survey (USGS) map is considered a waterway. The California Department of Fish and Game may also designate other areas as protected waterways, such as roadside ditches or ephemeral streams. When in doubt, consult with your representative from the California Department of Fish and Game. The 1601 agreement specifically prohibits polluting the waters of the state and may specifically prohibit certain activities at certain times of the year, such as work in the river during spawning season. The agreement may also require the contractor to undertake specific measures, such as installing fish ladders. Violations of the agreement are punishable by fine, imprisonment, or both.

Section 5650 of the Fish and Game Code prohibits the placement of specified materials in the waters of the state. Violations can result in major fines or even jail. Examples of violations include the following:

- Causing dirt and sediment to enter the waters of the state.

- Using creosoted timbers in the waters of the state.
- Placing petroleum products, such as asphalt or diesel, into, or where they can get into, the waters of the state.

Placing asphalt concrete grindings, chunks, and pieces in areas where they can pass into the waters of the state is also a violation of Section 5650 of the Fish and Game Code. A memorandum of understanding exists between the California Department of Fish and Game and Caltrans regarding the placement of asphalt concrete pavement grindings as shoulder backing and the placement of asphalt concrete pieces and chunks in embankments. For a discussion of reusing asphalt concrete as fill material and shoulder backing and a summary of the memorandum of understanding, refer to Section 611.11, "Conservation of Materials and Energy," of the *Highway Design Manual*. If a question exists as to whether asphalt concrete grindings or chunks may get into the waters of the state, consult with your California Department of Fish and Game representative.

7-105C List of Potential Permits

The first table below may be used as a guideline for when permits or approval of contract plans may be required from state or local governmental agencies. The left-hand column lists the activity or a resource affected by construction activity. The second column lists the agency or agencies that may have jurisdiction in the area shown in the first column. The third column indicates the type of permit or plan approval that may be required by the agency or agencies. Most required permits and plan approvals should be obtained during the project's design phase. However, the table may be used as a reminder of the types of permits and plan approvals that may be required when making changes to the original plans.

The second table below lists federal environmental statutes and regulations. The first column lists resources or activities. The second column shows the federal agency having jurisdiction in the area, and the third column lists the statute or regulation that applies to the resource or activity.

Table 7-1.1 State and Local Agency Permits (1 of 3)

Resource or Activity	Agency	Permit or Approval
Commercial, industrial, and residential development	Local agency (county or city)	Land use, general plans, specific plan, conditional use, or subdivision
Conversion of timberland to nonforest uses through timber operations and immediate timberland production zone rezoning	California Department of Forestry	Timberland conversion permit
Power transmission lines, pipelines, and railroad crossings	Public Utilities Commission	Review of plans and approval
Solid waste disposal	California Integrated Waste Management Board	Disposal requirements
Sewage disposal	County health department	Disposal requirements
Waste discharge	State Water Resources Control Board; Regional Water Quality Control Board	Discharge requirements
Storing, treating, or disposing of hazardous waste	Department of Toxic Substances Control State Water Resources Control Board; Regional Water Quality Control Board; local agency	Hazardous Waste Facilities Permit Hazardous waste discharge requirements; Underground Storage of Hazardous Substances Permit
Right-of-way across state parkland	California Department of Parks and Recreation	Right of-way permit, license, easement, joint agreement, or lease
Encroachment on or across a local street or highway	Local agency (county or city)	Encroachment permit
Encroachment on 100-year floodplain, intermittent streams, and desert washes	California Department of Fish and Game	Lake/Streambed Alteration Agreement (1601 agreement)
Encroachment on or across cove, bay, or inlet	Department of Boating and Waterways	Review of plans
Air quality	Air Resources Board or local air pollution control district	Authority to construct and permit to operate for activities emitting stationary source pollutants to the atmosphere
Fish and wildlife habitat	California Department of Fish and Game	Lake/Streambed Alteration Agreement for activities in lakes, streams, and channels and crossings

Table 7-1.1 State and Local Agency Permits (2 of 3)

Water	California State Lands Commission State Water Resources Control Board; Regional Water Quality Control Board Department of Health Services, Division of Drinking Water and Environmental Management; or local health office	Land use lease (for encroachments, crossings on tidelands, submerged lands, and so forth.) National Pollutant Discharge Elimination System Permit for storm water discharges to surface water; Waste discharge requirements for nonstorm discharges to surface water or groundwater to the waters of the state Permit to Operate a Public Water System
Dredging	California Department of Fish and Game State Lands Commission	Standard or special suction dredging permit dredging permit
Surface (material borrow sites, and so forth)	Local agency (county or city)	Surface Mining and Reclamation Act (SMARA) permit
Burning	Local air pollution control district; California Department of Forestry; local fire control agency	Burn permit
Grading	Local agency (county or city)	Grading permit
Entering private property - to gather information - for temporary use	Caltrans district right-of-way unit Caltrans district right-of-way unit Property owner right of entry approval	Property owner approval for temporary encroachment
Entering surface waters to gather information or for construction	Regional water quality control board	Water quality certification or waiver
All activities involving dams or reservoirs	California Department of Water Resources, Division of Safety of Dams	Approval of plans

Table 7-1.1 State and Local Agency Permits (3 of 3)

Resource or Activity	Agency	Federal Statute, Regulation or Executive Order
Water	US Army Corps of Engineers ; United States Environmental Protection Agency (EPA); Bureau of Reclamation; U.S. Fish and Wildlife Service; National Marine Fisheries Service	Federal Clean Water Act (Section 404) Regulations concerning the National Pollutant Discharge Elimination System (40 CFR)
Air	United States Environmental Protection Agency	Clean Air Act, Title 42, sections 7401 through 7414
Fish and Wildlife Habitat	U.S. Fish and Wildlife Service; U.S. Forest Service; The National Park Service; National Marine Fisheries Service	Endangered Species Act (Section 7)
Navigable Waters	US Army Corps of Engineers; U.S. Coast Guard	Rivers & Harbor Act
Federal Lands	U.S. Forest Service; Bureau of Land Management; National Park Service	
Historic Properties	Advisory Council on Historic Preservation	National Historic Preservation Act (Section 106)
Coastal Zone	US Army Corps of Engineers; U.S. Fish and Wildlife Service; National Oceanic and Atmospheric Administration	
Wild and Scenic Rivers	National Park Service	Code of Federal Regulations: 36 CFR 297; 43 CFR 8350
Wetlands	US Army Corps of Engineers; United States Environmental Protection Agency	Executive Order 11990 (Protection of Wetlands)
Floodplains	Federal Emergency Management Agency	Executive Order 11988 (Floodplains Management)
Dredging	US Army Corps of Engineers; U.S. Coast Guard	
Airport Airspace	Federal Aviation Administration	Federal Aviation Regulations, Part 77
Farmland	National Resources Conservation Service	Farmland Protection Policy Act

7-106 Environmental Hazards and Safety Procedures

7-106 Environmental Hazards and Safety Procedures

This section contains guidelines for handling and dealing with hazardous materials, hazardous waste, and hazardous spills on construction projects. See Table 7-1.2, "Unknown Hazards Procedures," at the end of this section for properly handling underground tanks, gases, odors, and uncontained spills.

7-106A Hazardous Materials

Many hazardous materials are used in the construction of highway facilities. Employees must take appropriate precautions to minimize their exposure and use protective clothing and equipment. Contractors must submit material safety data sheets and obtain permission from the resident engineer before bringing any hazardous material onto the job site. For instructions, guidelines, and requirements for handling hazardous materials to ensure employee safety, see Chapter 16, "Hazardous Materials Communication Program," of the *Caltrans Safety Manual*. For guidelines for the use of pesticides, see Section 4-20, "Erosion Control and Highway Planting," of the *Construction Manual* (manual).

Some special permits are required for dealing with hazardous materials during construction. Demolishing a bridge, whether new, old, or temporary, requires an asbestos survey and a permit from the local air quality management district. Reusing soils contaminated with aerially deposited lead is generally prohibited. For low levels of lead contamination, Caltrans has a variance to this rule issued by the Department of Toxic Substances Control. This variance is not automatic. You must notify the department before working under the variance.

For guidance regarding special permit requirements, contact the district environmental unit.

7-106B Hazardous Waste

District construction division must have a designated district hazardous waste coordinator who will carry out necessary administrative functions for hazardous waste. The coordinator will work with other functional areas in the district and headquarters to do the following:

- Identify hazardous waste training needs.
- Ensure the proper notifications if unidentified waste is found during construction.
- Provide field personnel with procedures and other information so that the personnel may safely deal with known and unknown waste.

Caltrans construction employees must follow safe practices and minimize their exposure when dealing with hazardous wastes. Minimize potential risks during project construction by having all construction personnel follow the general procedures below:

- After unknown and potentially hazardous wastes (including underground tanks) are discovered, cease construction work in that area.
- Secure the vicinity of the find by cordoning off the area with barriers or fences, and evacuate the vicinity if the resident engineer deems such an action necessary.
- Prohibit construction personnel from any exploratory or investigative work that would result in further personal exposure. Such personnel are prohibited from taking samples or testing potentially hazardous waste. This prohibition includes activities such as the following:

  1. Touching, smelling, or ingesting suspected materials.

2. Climbing into trenches or enclosed areas where contamination is suspected.

3. Reaching, looking, or placing a foreign object (such as a stick to probe or a rock to test depth or to determine the presence of a liquid) into exposed or leaking tanks or other enclosed spaces.

- For any necessary exploratory, investigative, or cleanup work, use specialized consultants or safety workers who are fully trained, licensed, and qualified for hazardous waste work in accordance with state and federal regulations.
- Because of potentially catastrophic health effects, the Code of Federal Regulations, Title 29, Part 1910.120 (29 CFR1910.120) requires that no one enter the designated exclusion zones until the establishment of a complete and effective "hazardous waste worker protection program" or until the consultant has determined no exposure danger exists. (The designated exclusion zones are delineated in the consultant prepared hazardous waste site safety plans.)

7-106B (1) Hazardous Waste Disposal Contracts

When dealing with the identification, assessment, and mitigation of hazardous material or waste, the resident engineer must obtain technical assistance. This assistance is available from the district hazardous waste coordinator and staff in the Division of Environmental Analysis' Noise, Air, and Hazardous Waste Management (NAHW) Office. The NAHW is responsible for providing construction hazardous waste emergency contracts and providing procedural direction. In addition, you may seek assistance from the maintenance hazardous spill coordinator.

When using the construction hazardous waste emergency contracts, the resident engineer must request all needed services and act as the contract manager. The resident engineer may not delegate this overall responsibility for the hazardous waste portion of the project. The resident engineer reports all expenditures for hazardous waste to the construction hazardous waste coordinator in the district construction office.

The resident engineer must also coordinate activities under the contract with other Caltrans functional units. When hazardous waste or underground tanks are found, the resident engineer notifies both the district and the Division of Construction. The resident engineer also notifies the district Proposition 65 coordinator and the NAHW in Sacramento.

As contract manager, the resident engineer must do the following:

- Provide funds for the work from project contingency funds or from supplemental funds obtained through a funds request.
- Request services under the contract.
- Prepare the work request.
- Process the work request authorization.
- Authorize the contractor to begin work.
- Ensure work is performed as stipulated in the work request and according to the contract terms.
- Review and approve invoices for payment.
- Review reports.
- Maintain project records in regard to the hazardous waste work.
- Evaluate contractor performance when work is not performed satisfactorily.

7-106B (2) Removal of Yellow Traffic Stripe and Pavement Markings

Follow the procedures below when assessing, removing, and disposing of yellow traffic stripe and pavement marking materials on all projects.

7-106B (2a) Construction contract review:

The resident engineer must review the construction contract to determine whether yellow traffic stripe and pavement marking material must be removed. If so, the resident engineer must also determine whether special handling as a hazardous waste is specified. The project may proceed as planned if one of the following situations exist:

- All yellow traffic stripe and pavement marking material to be removed has been previously assessed and found to be free of lead.
- Yellow traffic stripe or pavement marking material to be removed has been tested and found to contain lead, and its removal and disposal as a regulated or hazardous waste is specified.
- If yellow traffic stripe and pavement markings are to be removed and the removal has not been addressed in the contract, the resident engineer must consult with the district hazardous waste coordinator and have lead testing done.

7-106B (2b) Testing and removal requirements:

The resident engineer may order the prime contractor to test the striping and marking materials for lead. This testing should be paid for as extra work. Depending on the result of testing, proceed as follows:

- *Nonregulated levels of lead found*: If no lead is detected by the initial testing or is detected at levels less than 350 ppm total lead and less than 5 ppm soluble, no additional testing or collection of residues is required. The contractor can dispose of the residue as with any other construction debris.
- *Nonhazardous regulated levels of lead found*: When lead levels detected by testing are less than 5 ppm soluble and less than 1,000 ppm total but more than 350 ppm total, an employee safety and health plan does not have to be prepared. Measures to suppress dust and follow good personal hygiene are still required. All residue resulting from yellow traffic stripe and pavement marking removal, including any removal agent, must be collected and stored in sealed drums. The material must be retested and disposed of appropriately as set forth in "Retesting and Disposal," later in this section.
- *Hazardous levels of lead found*: Should the lead levels detected by this initial testing be greater than 1,000 ppm total lead or greater than 5 ppm soluble lead, treat removal as lead abatement work. Even when not contemplated in the contract, the abatement of lead contained in striping by the construction contractor is allowable under Section 25914.2 of the Health and Safety Code and Section 7058.7(d) of the Business and Professions Code. The contractor must test the striping material when directed but may refuse to do the abatement work when it was not included in the original contract. If the contractor refuses the lead abatement work, one of the construction hazardous waste emergency contractors will perform the work. Proceed as follows when lead abatement is required.

- *Training*: The contractor responsible for lead abatement must provide a safety training program that meets the requirements in Section 1532.1, "Lead," of the *Construction Safety Orders*. Before performing any yellow traffic stripe and pavement marking removal, personnel (including Caltrans employees) who have had no prior lead training must complete the safety training program.

- *Lead abatement program*: Work practices and worker health and safety must conform to Section 1532.1, "Lead," of the *Construction Safety Orders*. The contractor must submit the written compliance programs required in Subsection (e)(2), "Compliance Program," of Section 1532.1, to the engineer before starting to remove yellow traffic stripes and pavement markings and at such times when revisions to the programs are required. An industrial hygienist certified by the American Board of Industrial Hygiene must prepare the compliance programs. A competent person who is capable of taking corrective action must monitor the programs. Require that copies of all inspection reports made in accordance with Section 1532.1 are given to the resident engineer.

- *Storage of residue*: The contractor must store the residue from traffic stripe and pavement marking removal as follows:

  1. While waiting for any test results required by the disposal facility, store the collected residue in properly labeled containers approved for the transport of hazardous waste by the U.S. Department of Transportation.

  2. Cover and handle the containers in such a manner that no spillage will occur.

  3. Enclose the stored containers with temporary fencing at a location within the project limits approved by the engineer.

  4. Begin disposing of the contained residue no more than 90 days after accumulating 100 kg of residue.

- *Retesting and disposal*: Before disposal, retest the residue collected in the containers. The level of lead waste contained in the removed material will be diluted by pavement debris that has also been removed. Depending on the test results, dispose of the stored material as follows:

  1. The contractor can dispose of the stored material in the same manner as any other construction debris when the stored material's lead content is detected at levels less than 350 ppm and less than 5 ppm soluble.

  2. The abatement contractor must take the stored residue to a Class 1 disposal site when its lead content is detected at levels greater than 350 ppm but less than 1,000 ppm total lead and less than 5 ppm soluble. However, in this case, the stored residue does not require hazardous waste manifesting or handling by a registered hauler. In the project files, retain the records of the testing and the amounts of residue tested and disposed.

  3. Treat the stored residue as hazardous waste when its lead content is detected to be at levels greater than 1,000 ppm total lead or greater than 5 ppm soluble. Keep records in accordance with current requirements for hazardous waste handling and disposal, and file them in the project files. The abatement contractor must dispose of all residues resulting from yellow traffic stripe and pavement marking removal at an approved

Class 1 disposal facility in accordance with the requirements of the disposal facility operator. A transporter currently registered with the Department of Toxic Substances Control using correct manifesting procedures must haul the yellow traffic stripe and pavement marking residue.

The abatement contractor must make all arrangements with the operator of the disposal facility and perform any testing of the yellow traffic stripe and pavement marking debris required by the operator. The abatement contractor must submit the name and location of the disposal facility along with the testing requirements to the engineer before starting removal of yellow traffic stripe and pavement markings on the project. The resident engineer must obtain the United States Environmental Protection Agency identification number and sign all manifests as the generator.

4. Unless the lead removal work was already contemplated in the construction contract, pay as extra work all work performed for testing, additional removal costs, retesting, and additional disposal.

7-107 Hazardous Spills

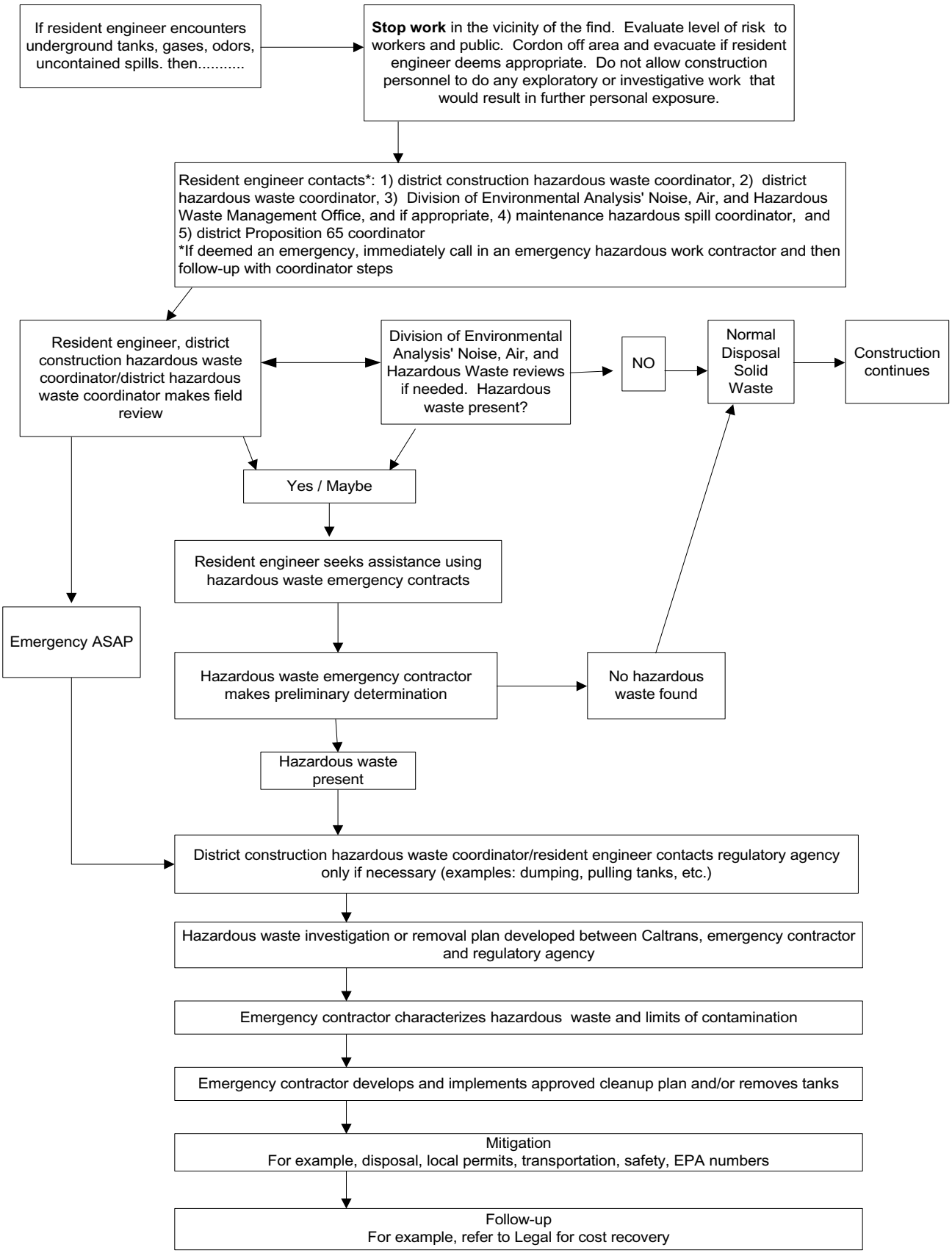
7-107
Hazardous Spills

Each district maintenance unit has a maintenance hazardous spill coordinator and other personnel trained in handling highway spills. When an unknown substance is deposited or spilled from a vehicle on a roadway because of a construction project, contact the maintenance hazardous spill coordinator for assistance in containment, identification, and cleanup. For instructions on reporting hazardous highway spills, see Section 2-3, “Major Construction Incidents,” of this manual. If the contractor spills hazardous materials, the contractor must comply with applicable laws and regulations as well as cleanup and disposal.

If an unidentified spill is expanding and threatening adjacent sensitive areas, begin containment immediately if it can be done without personal exposure.

Conventional methods for containment include interception with dikes or ditches at sufficient distance downstream to avoid contact with the material. Prevent employees, workers, or the public from being exposed to any unknown spilled material.

Table 7-1.2 Unknown Hazards Procedures



Section 1 Labor Compliance

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8-108A Federal Law
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8-108A (2) Prevailing Wage Provisions of Davis-Bacon Act.
8-108A (3) Work Hours Act of 1962
8-108A (4) False Information Act
8-108B State Law

Section 1 Labor Compliance

Section 1 Labor Compliance

8-101 General

8-101 General

This section presents the guidelines for administering the labor compliance provisions of the contract. These guidelines apply to all projects, whether state or federally funded. The California Labor Code, the Code of Federal Regulations, Title 29, Part 5 (29 CFR 5), and regulations of the Federal Highway Administration (FHWA) and the United States Department of Labor provide the basis for contract administration protocol and the statutory authority to enforce labor compliance contract provisions.

State and federal laws require contractors working on public works contracts to pay prevailing wages to their employees. Prevailing wages are predetermined hourly rates for each craft that are set by both the California Department of Industrial Relations and the United States Department of Labor. In addition, these laws set guidelines for such things as the following:

- Overtime
- Length or shifts of workday
- Substantiation of wages
- Fringe benefits paid
- Covered work (work done under contract and paid for in whole or in part out of public funds, thus requiring the payment of prevailing wages) and noncovered work

The Federal-aid Highway Acts of 1956 and 1968 provide an active program to ensure that laborers and mechanics employed on federal aid projects are paid at wage rates generally prevailing for the same type of work on similar construction in the immediate locality. The federal wage rate determinations are included in the contract.

The California Labor Code provides that the California Department of Industrial Relations, Division of Labor Statistics and Research (DLS&R) will determine and publish the general prevailing wage rates and those rates are referenced in the contract's special provisions.

The Division of Construction labor compliance unit establishes policy for and administers FHWA-delegated labor compliance responsibilities, as well as the Department of Industrial Relations approved Caltrans' labor compliance program (LCP). The labor compliance and civil rights function is a unit of the Division of Construction.

8-102 Labor Compliance Responsibilities

The responsibilities and procedures when administering the contract's labor compliance requirements are described as follows:

8-102A Resident Engineer

8-102A (1) Resident Engineer General Responsibilities

At the project level, the resident engineer has the responsibility for enforcing the labor requirements that are in the contract special provisions. To fulfill this responsibility, the resident engineer and support staff must have an adequate working knowledge of the contract labor standards.

Early surveillance and detection of labor compliance violations are preferable to conducting belated investigations and implementing formal enforcement actions. Caltrans encourages the resident engineer to bring labor compliance issues to the attention of the contractor and the district labor compliance officer immediately upon detection. Resolve minor issues, such as clerical errors or inadvertent acts, at the project level. Give the contractor ample opportunity to take corrective action so that the dispute can be quickly resolved informally. At the time the labor compliance issue is identified, take a deduction from payment due the contractor. Base any decision to take deductions on the recommendation of the district labor compliance officer. If the contractor provides evidence of full restitution, promptly return the deduction to the contractor. In the event, the contractor does not take corrective action, the resident engineer must notify the district labor compliance officer.

When the contractor knowingly violates labor law or refuses to comply with the contracts labor provisions, the contractor has committed a willful labor compliance violation. Willful violations include situations such as fraud, wage kickback schemes, or falsification of certified payrolls, fringe benefit statements, evidentiary source documents, and daily extra work bills. These violations require that the district labor compliance officer conduct a full investigation and report the findings to the resident engineer and the Division of Construction labor compliance unit.

8-102A (2) Resident Engineer Project Responsibilities

The resident engineer's specific responsibilities are:

- Ensure that labor compliance, equal employment opportunity (EEO), and disadvantaged business enterprise (DBE) or disabled veterans business enterprise (DVBE) requirements are discussed at the preconstruction conference. Document this discussion, and file the information in the project records.
- Forward all labor compliance, EEO, DBE, and DVBE documents submitted by the prime contractor to the district labor compliance office.
- Refer all employee complaints regarding EEO or wage underpayments to the district labor compliance office.
- Verify that required posters are displayed at the job site.
- Notify the district labor compliance office of all contractor and subcontractor activity during the week.
- After receiving recommendations from the district labor compliance officer, authorize deductions from progress pay estimates for labor compliance, EEO, DBE, and DVBE violations.

- Document labor compliance project activities on the assistant resident engineer's daily report. Minimally, this documentation must include the following information:

  1. Contract number
  2. Name of contractor with name of employee
  3. Hours worked
  4. Classification of employees
  5. Items of work with description and operated equipment with name of operator and name of operator's employer

- Confirm that wage rates and hours listed on extra work bills match prevailing wage rates and hours listed on the contractor's certified payrolls.
- Ensure that Caltrans personnel under resident engineer supervision properly record charges for labor compliance activities. Details are available from the district labor compliance officer and the Caltrans *Coding Manual*.
- Conduct employee interviews, and transmit to the district labor compliance office fully completed interview forms. (For more information about these interviews and forms, see below under the heading "Interviews With Contractor Personnel.") The frequency of these interviews should be at the rate of three employees per contract, per month, including at least one interview from the prime contractor and each subcontractor until such time as the contract is accepted or that all employees on the project have been interviewed. The number of interviews taken must constitute a representative sample of workers employed on the project.

8-102A (3) Interviews With Contractor Personnel

The contract labor standards require the contractor to allow authorized Caltrans personnel to interview contractor employees during working hours.

Generally, record employee interviews on Form CEM-2504, "Employee Interview: Labor Compliance / EEO." The employee interview is used to check the validity of information shown on the payrolls and payroll records. The employee is asked questions regarding wage rates, hours of work, and type of work performed. When an interview indicates a reporting deficiency or labor compliance violation, notify the labor compliance officer, who will conduct a full investigation. Send the original form to the district labor compliance officer.

In the case of a small contractor having two or three employees on the project for several months, you won't need to keep taking interviews once all the contractor's staff have been interviewed and the resident engineer is satisfied that the contractor is fully compliant with the labor compliance provisions of the contract. If the resident engineer chooses to suspend further interview activity, document the decision in the project records.

During the interviews, assure the interviewees that their statements, whether oral or written, will be confidential. Do not disclose to the employer the identity of the employee without the employee's consent.

In addition to conducting the usual interviews, interview truck and equipment operators designated as "owner-operator" to determine the correctness of this classification. Factors that establish the validity of the "owner-operator" classification are described below in Section 8-103D (2), "Payrolls and Listings Involving Owner-Operator."

8-102B District Labor Compliance Officer

The district labor compliance officer administers and monitors the labor compliance policy by assisting resident engineers in the enforcement of the labor compliance requirements in the contract special provisions.

8-102B (1) District Labor Compliance Officer General Responsibilities

Under the general direction of the district construction deputy director, the district labor compliance officer has immediate charge of the district labor compliance office and must directly supervise and train those assigned to assist in administering and monitoring labor compliance and other related contractual obligations. Further, the district labor compliance officer must ensure that employees use proper charging practices when performing labor compliance activities.

The administration and monitoring of labor compliance provisions extends to all types of state and federal highway construction projects including the following:

- Minor contracts
- Service contracts
- Maintenance contracts
- Right-of-way demolition contracts
- Local assistance projects

8-102B (2) Labor Compliance Officer Project Responsibilities

The district labor compliance officer's specific responsibilities, in assisting the resident engineer to administer contracts, are:

- Attend or delegate attendance at the preconstruction conference. Discuss the labor compliance, DBE or DVBE, EEO and subcontracting provisions of the contract.
- Provide appropriate labor compliance training for district project personnel.
- Review employee interviews and cross-check wage rates and classifications against certified payrolls. Forward one copy of the employee interview to the Division of Construction's labor compliance unit.
- For investigation and follow-up, refer EEO complaints to the contract compliance unit of Civil Rights. For detailed information on the EEO complaint process, refer to Section 8-2, "Equal Employment Opportunity," of the *Construction Manual* (manual).
- To ensure certified payrolls are accurate and complete, use random sampling to crosscheck the payrolls against assistant resident engineers' diaries. Crosscheck classifications, hours, names, and state and federal prevailing wage rates. To supplement payrolls, use apprenticeship agreements and fringe benefit statements.
- When necessary, recommend to the resident engineer that appropriate deductions be withheld from progress payments made to the contractor.
- To determine if the labor compliance provisions of the contract have been breached and to verify the accuracy of payrolls, review source documents at the contractors' office and collect evidence.

- During the life of a contract, review contractors and subcontractors with a history of poor labor standards practices. The Division of Construction's labor compliance unit maintains a master file of contractors' payroll source documents reviews. The objective of the master file is to avoid unnecessary or repetitious source document reviews. Therefore, when a district anticipates making a review, first call the Division of Construction's labor compliance unit to determine if a similar review occurred recently on the same contractor. When a review has been completed, fill out Form CEM-2508, "Contractor's Payroll Source Document Review," and Form CEM-2509, "Checklist - Source Document Review." Forward these forms to the Division of Construction's labor compliance unit.

- When wage underpayments have occurred, prepare labor compliance violation cases and submit them to the Construction Program labor compliance unit for approval. Upon review and approval, the Construction Program labor compliance unit will submit the case to the California Department of Industrial Relations for state labor code violations. A copy must be retained in the project records when federal labor laws have been violated.

- If the contractor appeals the findings and final recommendations of a labor compliance violation case, represent the district during the administrative hearing process or during court proceedings.

8-102C Contractor

Labor compliance regulations are included in the contract special provisions. The prime contractor is responsible for labor compliance for its own company as well as all subcontractors. In this section, the term "subcontractor" applies to all subcontractors (approved or not) employed by the prime contractor and all lower-tier subcontractors who perform "covered" employment as described under the heading "Covered and Noncovered Employment" later in this section. On federal contracts, the prime contractor must insert the labor regulations in all subcontracts and in turn subcontractors must include these regulations in all lower-tier subcontracts. Labor provisions of the contract require the same standard of performance from prime contractors and subcontractors as expected of all other requirements of the contract. For noncompliance with contract labor provisions, Caltrans has statutory authority to withhold payment to the prime contractor for back wages and penalties.

8-103 Certified Payroll Requirements

8-103 Certified Payroll Requirements

A payroll is a record of all payments a contractor made to employees working on the project. A certified payroll is one that contains the written declaration required in Section 7-1.01(3), "Payroll Records," of the *Standard Specifications*.

Subcontractors must submit to the prime contractor all certified payrolls, owner-operator listings, and statements of compliance. In turn, the prime contractor must submit these documents to either the resident engineer or the district labor compliance office by the 15th of the following month for the previous month. The payrolls can be submitted on the state-furnished Form CEM-2502, "Contractor/Subcontractor Payroll," or any alternate form that includes a statement of compliance with wording identical to that on Form CEM-2503, "Statement of Compliance." For every person employed at the job site that performed a part of the work, the following information must be contained on the certified payroll form:

- The employee's full name, address, and social security number. The employee's address and social security number need only appear on the first payroll on

which the employee's name appears. Company owners, superintendents, and nonworking foremen need only be listed by name, title, and hours worked. The employee's classification, including craft, group, and level of expertise. The labor classification used must be descriptive of the work actually performed and match the nomenclature used in the prevailing wage decisions.

- The employee's hourly wage rate. If the employee worked overtime hours, then report the applicable overtime hourly wage rate.
- The daily and weekly hours worked in each classification, including actual overtime hours worked. Add any premium for overtime hours worked to the rate of pay, not the reported number of hours worked.
- The gross wages, itemized deductions, withholdings, and net wages paid.

8-103A Review of Payrolls

Payrolls must conform to federal and state labor laws. The following are guidelines for checking certified payrolls. In most cases the labor compliance officer will conduct the payroll review; however in some districts, payroll documents are checked by the resident engineer.

8-103A (1) Fringe Benefit Statement

Contractors must use Form CEM-2501, "Fringe Benefit Statement," or equivalent to indicate payment of fringe benefits as a supplement to the certified payroll. A fringe benefit statement is a breakdown of benefits in addition to hourly wage rates that the contractor pays on behalf of the employee. Typical fringe benefits include vacation, health benefits, pension plans and training funds listed in the prevailing wage rates. The fringe benefit statement should also indicate to whom the fringe benefits have been paid, such as a union trust fund or as a cash payment made directly to the employee.

8-103A (2) Travel and Subsistence

When a project is located in a geographic area designated as a subsistence area, contractors are required to make travel and subsistence payments to their employees in accordance with the current collective bargaining agreements on file with the Department of Industrial Relations. Subsistence is to be paid as a lump sum daily payment or as an increased hourly wage rate, depending on the craft, classification, and bargaining agreement for each craft.

8-103A (3) Workday

Each workday is considered to begin at 12:01 am and to extend a full 24-hour period, ending at 12:00 pm. For those contractors working at night, for instance a Friday evening and Saturday morning, the payrolls should reflect regular pay rates of hours worked on Friday, and applicable premium rates of pay for all work beginning at 12:01 am on Saturday morning.

8-103A (4) Assistant Resident Engineers' Daily Reports

Using assistant resident engineers' daily reports, verify that the payroll reflects the labor used and the hours worked for each day of work at the job site, including weekends and holidays. The method of reporting hours is accurate, that the actual number of hours worked is clear, and the rate of pay can be readily determined.

8-103A (5) Wage Rates

The prevailing hourly wage rate is composed of the basic hourly wage rate plus fringe benefits. When state and federal wage rates differ, the contractor is required to pay the higher of the two. On federally funded projects, if payment is made at an hourly rate in excess of the prevailing rate, this hourly rate, less fringe benefit payments, is the basic hourly rate for computing overtime compensation.

8-103A (6) Overtime

After an employee works 8 hours in a calendar day or 40 hours in a calendar week, the employee is entitled to be paid at the proper prevailing overtime rate, but not less than one and one-half times the basic wage rate plus fringe benefits. The federal wage decisions do not differentiate between weekday rates of pay and Saturday or Sunday rates of pay; however, the state prevailing wage rates do list premium rates of pay for work performed on Saturdays and Sundays.

8-103A (7) Apprentices

Apprentice classifications are correctly identified and that the type of work and ratio of apprentices to journeyman meet the requirements of the apprenticeship agreement on file with the Division of Apprenticeship Standards. A disproportionate employment of apprentices to journeymen could indicate that some of the apprentices are working outside the limits of their classification. When this occurs, excess apprentices must be paid at the journeyman rate.

8-103A (8) Deductions

Payroll deductions should have a complete, clear, and concise breakdown. The contractor may not combine payroll deductions on the payroll form without proper identification unless an attachment specifies supplemental data with the purpose and amount of each deduction.

All deductions must comply with the Department of Labor, Code of Federal Regulations, Title 29, Part 3, "Copeland Anti-Kickback Act." Additional regulatory language can be found in Chapter 1, "Payment of Wages," Sections 213, "Limitations Upon Effect and Applicability of Section 212," and 224, "Withholding or Diverting Portion of Wages Under Law or Written Authorization," of the California Labor Code.

8-103B Wage Calculation Methods

Payrolls are acceptable if they are prepared in accordance with either of the methods shown below. These examples illustrate a situation where an employee worked 10 hours on a given day, overtime premium of one and a halftimes the basic hourly rate of $14.00 per hour, $2.00 per hour subsistence, and with fringe benefits amounting to $6.00 per hour.

Method One: Basic reported hours of work

8 hours @ $22.00/hour = $176.00

2 hours @ $29.00/hour = $ 58.00

Total Pay for the day = $234.00

Method Two: Adjusted rate of pay

10 hours @ $22.00/hour = $220.00

2 hours @ $ 7.00/hour = $ 14.00

Total Pay for the day = $234.00

8-103C Payroll Deductions

This section covers payroll violations, discrepancies, delinquencies or inadequacies. The contractor must submit payrolls and accompanying statements of compliance in accordance with the special provisions and Section 7-1.01A(3), "Payroll Records," of the *Standard Specifications*.

8-103C (1) Inadequate payrolls

When discrepancies are found during payroll review, the following procedures must be taken:

- The district labor compliance officer must request that the contractor submit a supplemental payroll correcting the discrepancy. Under no circumstances should you return incorrect or incomplete certified payrolls to the contractor for revision. However, the contractor may make corrections to certified payrolls if those corrections are written in ink and the contractor initials each correction in the presence of Caltrans personnel.
- The contractor must then make the corresponding correction to its payroll records and provide proof of wage restitution for all effected employees. This can be in the form of canceled checks, copied both front and back.
- To ensure that payroll inadequacies or discrepancies are corrected, use a tabulation or summary sheet to record discrepancies and to note when and how each error was corrected. This record need not be elaborate. In most cases, a simple tabulation showing the name of the person or firm, the payroll period or week ending date, the discrepancy, and the method of correction is sufficient. The labor compliance officer must fill out Form CEM-2507, "Labor Violation: Case Summary" and submit it, along with a copy of the tabulation, to the Division of Construction labor compliance unit.

8-103C (2) Delinquent payrolls

If payrolls and statements of compliance have not been received for all weeks that the contractor or subcontractors worked on the project, consider the payrolls delinquent. The labor compliance officer must notify the resident engineer and the contractor which certified payroll documents are missing.

The resident engineer must deduct monies due to the contractor on the monthly progress pay estimate in accordance with Section 7-1.01A(3). Make deductions separately for each estimate period in which a new delinquency appears. When all delinquencies for a period have been corrected, release the deduction covering that period on the next progress pay estimate.

8-103C (3) Missing payroll Deductions

Example 8-1.1 Estimate Number One

The following examples illustrate the process for taking and releasing deductions on the monthly progress pay estimates.

Progress pay estimate number one has a value of $9,500.

Value of the deduction is 10 percent of $9,500 or $950.

Therefore, the resident engineer must deduct the minimum amount of $1,000.

Example 8-1.2 Estimate Number Two

Estimate number two has a value of $49,000.

One or more pay documents are still delinquent under a previous month's deduction plus one or more new delinquencies for this period.

Value of the deduction is 10 percent of $49,000 or $4,900. Last months deduction was a total of $1,000. Therefore, the resident engineer should have a total deduction of $5,900 from the current progress payments due to the contractor.

Example 8-1.3 Estimate Number Three

The delinquencies are all cleared up for the previous month but new delinquencies have originated during this period. Estimate number three has a value of $55,000.

Value of the deduction is 10 percent of $55,000 that is equal to $5,500. Total deductions for this pay period are $5,500.

The resident engineer should return $5,900 - $5,500, or $400 to the contractor for the current progress pay estimate.

Example 8-1.4 Estimate Number Four

The contractor has not corrected the problems with the payrolls in question during progress pay estimate number three. No new delinquencies have occurred. No additional deduction is warranted. Make no change to the amount of money deducted from the contractor for this period, and continue to hold $5,500.

Example 8-1.5 Estimate Number Five

Progress pay estimate number Five is for a total of $120,000. The contractor has a carry over deduction from progress pay estimate four of $5,500.

There are new payroll delinquencies for this pay period. The value of the current deduction is 10 percent of $120,000 or $12,000. However the maximum allowable deduction for missing labor compliance documents is $10,000 per pay estimate.

The total value for labor compliance violations is $10,000 + $5,500 = $15,500.

8-103C (4) Refusal to provide payrolls

If the contractor refuses to submit certified payrolls, in accordance with Section 7-1.01A(3), "Payroll Records," of the *Standard Specifications* and the requirements of the special provisions, notify the contractor by certified mail that payrolls have not been received. The letter should advise the contractor that they are in violation of the contract, and that if payrolls are not submitted within 10 days of receipt of this letter, penalties will be assessed in accordance with Section 1776(g) of the California Labor Code in the amount to $25.00 per worker for each calendar day the payroll has not been submitted. If the payroll has not been turned in after 30 days of the date

of the letter, the resident engineer should request the district labor compliance officer's assistance to subpoena these documents. Process an administrative deduction in the full amount of labor compliance penalties on a monthly basis. These deductions are penalties and are not refundable to the contractor, regardless of the method used to obtain the payrolls. Careful consideration should be given before assessing these permanent deductions.

8-103C (5) Correlation of Payrolls and Extra Work Bills

Compare the labor charged by the contractor for extra work with the corresponding payrolls. The certified payrolls and fringe benefit statements serve as source documents for approval of every extra work bill. The extra work bill must show the identical labor classifications, hours worked, and wage rates, including fringe benefits, that are shown on the certified payroll documents. The labor compliance office must notify the resident engineer immediately of any discrepancy. Do not approve payment of the extra work bill until the discrepancy is corrected or it is determined by the labor compliance officer to be a labor compliance violation; not an extra work overcharge.

8-103C (6) Withholding Payment for Violations

For any labor compliance violation that results in penalties assessed against the contractor, use the following procedure:

The district labor compliance officer must conduct a full investigation of the facts and circumstances of the case. The facts of the case will determine whether the wage violation was inadvertent, a mistake, or a willful violation. Based on the intent of the violation, recommend the penalty amount to be assessed against the contractor in accordance with the provisions of the contract and the California Labor Code. The Division of Construction labor compliance unit will review the case. In all situations other than inadvertence or mistake, the Division of Accounting Services Disbursing Office will withhold the full amount equaling the state and federal penalties and the amount of wage underpayments.

When the California Department of Industrial Relations, Division of Labor Standards Enforcement receives a complaint, that complaint will be forwarded to the district labor compliance officer for investigation of wage underpayment. If a wage underpayment is found, the district labor compliance officer must write up a formal labor violation case, make appropriate including recommendations for penalties, and submit it to the Division of Construction labor compliance unit.

8-103C (7) Documents Outstanding at the Time of Contract Acceptance

When there are outstanding documents, such as payrolls, take an "Other Outstanding Documents" (OOD) deduction from payment to the contractor on the after acceptance estimate as covered in Section 3-9, "Measurement and Payment," of this manual.

<u>8-103D Review of Owner-Operator Listing</u>

Contractors are required to list all owner-operators used on covered work and certify owner-operator status by providing at least the following information:

- Operator name as shown on all payrolls.
- Business address of the owner-operator.
- The owner-operator's social security number.

- The tractor license number. If the equipment is used off highway, the contractor must provide a complete description of the equipment and include the dates that equipment was operated on the project.
- Operator labor classification
- Hours worked by the owner-operator as reported on a daily basis.
- Hourly rental rate paid for the owner-operated equipment
- Gross estimate or actual payments earned.

This information must be provided by the contractor on Form CEM-2505, "Owner-Operator Listing Statement of Compliance," supplied by Caltrans. Certification will be accepted only from the contractor employing the owner-operator. It is not appropriate to accept certified payrolls or an owner operator listing directly from the owner-operator unless that owner operator is a licensed contractor and is also an approved subcontractor or recognized lower tier subcontractor.

8-103D (1) Calculating Equipment Owner-Operator Payment Breakdown

From the information shown in the payroll, determine the hourly wage rate due by deducting the prevailing equipment rental rate for the area from the gross hourly rate shown on the owner-operator listing. The contract rental rate (without markup) may be used as a guide. Since this may not be the local prevailing rate, it may be necessary to canvass local rental agencies or other sources to determine the actual prevailing equipment rental rate.

Compare the hourly wage rate so determined to the applicable basic wage plus fringe benefits to determine compliance.

8-103D (2) Payrolls and Listings Involving Owner-Operator

Use the following requirements to differentiate an owner-operator from a contractor's employee:

- If review of payroll records show that deductions for social security taxes or state unemployment insurance taxes are withheld for the owner-operator, it is an indication that the operator is an employee rather than an independent contractor.
- An employee interview can be taken from the owner-operator on Form CEM-2504, "Employee Interview: Labor Compliance / EEO." If it is apparent that an owner-operator is in fact an employee, then all of the information required by interview Form CEM-2504, including the equal employment opportunity portion, is to be filled out completely and brought to the attention of the district labor compliance officer.

  <u>8-103D (2a) For truck owner-operators:</u>
  - The operator should be the registered owner of the vehicle. The name of the driver should match the name of the registered owner on the Department of Motor Vehicles' registration.
  - If the legal owner is a firm or corporation, and the firm or corporate name is shown on the vehicle registration slip, request that the driver furnish evidence that they are leasing or purchasing the vehicle. It is common for the name of the finance or leasing company to be listed on the registration. If the owner operator is leasing or financing the vehicle, then the operator should be able

to furnish such evidence. If the owner operator is unable to substantiate purchase or lease of the equipment, the resident engineer should disallow use of the owner-operator classification for this truck and contact the labor compliance officer.

- Insurance for the vehicle should be carried in the driver's name. Further checking is required if the name on the policy does not match the name of the driver.
- The California identification (CA) number issued by the California Highway Patrol (CHP) should be in the driver's name. If the name on the CA number doesn't match the name of the driver, further investigation is warranted.

If the ownership of a vehicle cannot be determined from the insurance, registration, or title, forward the license number or a CA number to the district labor compliance officer. The district labor compliance officer will send information to the Division of Construction labor compliance unit to be run through Department of Motor Vehicles' or CHP Motor Carrier Permit Division record check.

<u>8-103D (2b) For equipment other than trucks:</u>
If the owner operator is leasing or financing the equipment, then the operator should be able to furnish such evidence. If the owner operator is unable to substantiate that they are purchasing or leasing the equipment, the resident engineer should disallow use of the owner-operator classification for this piece of equipment. The contractor must establish proof of ownership in cases where there is doubt as to the validity of the owner-operator designation. If difficulty is encountered in determining truck ownership, all pertinent data should be submitted to the Division of Construction labor compliance unit.

8-104 Covered and Non-Covered Employment

8-104 Covered and Non-Covered Employment

Caltrans is responsible for enforcement of both federal and state labor compliance requirements for all contracts it advertises and awards. The California Labor Code requires that all public works projects are subject to the payment of prevailing wages for the immediate geographic area in and adjacent to the project.

Every laborer or mechanic employed at the job site who performs a part of the contract work is subject to the labor provisions of the contract. The laborer or mechanic may be either an employee of the prime contractor, an employee of an approved or listed subcontractor, or some other person or firm who furnishes on-site labor, including specialists.

The terms "jobsite" or "site of the work" as applied to labor compliance are not limited to the actual geographic location or limits of the project. In addition, these terms include any location or facility established for the sole or primary purpose of contributing to the specific project. Typical examples of these types of locations or facilities include material sites, processing plants, fabrication yards, garages, or staging sites set up for the exclusive or nearly exclusive furtherance of work required by the project. Essential criteria for job site or off site work is whether these facilities have been operating on a commercial basis for a period of at least two months prior to the award of the contract or whether that site performs a commercially useful function exclusively for this project.

Employees working at a job site or site of work are covered by the prevailing wage law and the provisions of the specific contract under investigation. In those cases when the distinction between covered and non-covered employment is not clear, the matter should be referred to the district labor compliance officer for evaluation.

8-104A Materials Sites

For labor compliance purposes, materials sites used exclusively for the project are considered as being on site. Employees at these sites must be paid prevailing wages. Factors that determine coverage of material sites include:

- The commercial or noncommercial nature of the operation
- The amount of contractor or supplier control of the site
- The exclusiveness of the material site to the project
- The location of the materials site relative to the project limits
- Which party has control of the materials loading operation

Typical situations for coverage determinations favoring the payment of prevailing wages include:

- A commercial source outside the project limits where the prime contractor loads a trucking company's trucks.
- An imported borrow pit, located outside the project limits used exclusively by the contractor for a specific project.
- A pit established exclusively for a project to supply materials.

In all three of the above cases the work is covered and the contractor is required to pay prevailing wages to employees.

8-104B Material Plants

Roadside production of materials produced by other than the contractor's forces is considered as "subcontracted" with respect to the contract labor standards.

Materials, including aggregates, produced with any kind of portable, semi-portable, temporary crushing, screening, proportioning, batching, or mixing plant are considered to have originated at a materials plant.

When a materials plant has been established or reopened exclusively or nearly exclusively for the purpose of supplying materials to a specific contractor for specific projects, and when these plants are not generally operated commercially, they are considered to be a site of the work and therefore covered for the payment of prevailing wages. Work involved in the establishment, reopening, and general operation of such plants will also likely be covered by the contract labor standards. Use the following guidelines to determine if a plant is commercial and therefore not covered by contract labor provisions:

- The operator has obtained a permit to operate as a commercial plant
- A business license has been obtained for the operation of the plant
- A public weigh master operates scales at the materials plant
- The contractor provides proof of sales to other agencies or individuals.

The prime contractor must demonstrate that the primary purpose of this materials plant is for general commercial operations. The contractor must provide proof that more than token sales have originated at this material plant.

8-104C Equipment Furnished by Equipment Rental Firms

Equipment is often rented or leased by contractors from established commercial equipment rental firms. The prevailing wage rate provisions of the contract do not cover drop off, pick up, and incidental repair of this equipment. When rented equipment used in the work, including extra work, is operated and maintained by employees of the equipment rental firm, the equipment rental firm is considered to be a "subcontractor" with respect to labor compliance. The employees of the rental firm are, in this situation, covered by the labor compliance requirements of the contract.

8-104D Equipment Furnished by Owner-Operators

Owner operators of general construction equipment such as graders, cranes, or excavators are considered covered by the Davis-Bacon Act. Since they are covered employees, the contractor must list them on Form CEM-2505, "Owner-Operator Listing Statement of Compliance." Workers must be paid at least the minimum prevailing wage rate in effect for the specific contract plus the appropriate equipment rental rate.

For labor compliance purposes, material transporters and independent truckers hauling materials directly from commercial sources are exempted from wage reporting all together. Claimed exceptions are subject to verification by the resident engineer.

Owner-operators of haul trucks, water trucks, or bitumen trucks are considered independent contractors not directly associated with the project. Therefore, these employees are not subject to the prevailing wage rate requirements of the contract. To verify owner-operator status, either the truck owner-operator is required to report hours worked on a certified payroll or the contractor must list the owner-operator on a certified owner-operator listing.

8-104E Repair of Equipment

General repair of equipment used on the job site or located at the site of work, including installing, overhauling, assembling, repairing, reconditioning, or other work on machinery, equipment, or tools used in or upon the work is a part of the work to be performed under the contract. Established, independent commercial repair shops that have operated for a period of at least two months prior to the award of the contract are not covered. Mechanics and other employees working on such machinery, equipment, or tools are covered by the contract labor provisions. Such employees must be listed on the contractor's or subcontractor's certified payroll records.

8-104F Work Performed by Vendors, Suppliers, and Fabricators

Suppliers and fabricators of materials who are not subcontractors and who do no work at the job site other than delivering materials are not subject to the contract labor requirements. However, a supplier or fabricator is a subcontractor subject to the labor provisions for that portion of the work performed at the jobsite. For instance:

- Shop work during fabrication of structural steel is not subject to the contract labor requirements. The contract labor provisions cover any structural steel work performed subsequent to delivery of material to the jobsite even though shop personnel may perform it. This includes repair of damaged or defective work, as well as normal installation or erection.

- Oil spreading by employees of asphalt suppliers is subject in certain conditions:
  1. Only the time spent on site spreading the material is covered work. Standby time is not.
  2. Coverage will apply only when the employee, during one workweek, has actually spent at least 20 percent of the total time worked spreading material on the specific project. Once a particular employee qualifies for coverage, all the actual spreading time that week is retroactively covered. Staggering employees to avoid coverage is permissible.
- Treat spreading of pavement reinforcing fabric in the same way that oil spreading work is treated.

At the job site, installation of any manufactured product, such as mechanical and electrical equipment, bridge deck expansion and bearing assemblies, sign frames, precast or precast-prestressed concrete beams, and all similar fabricated items is covered work and subject to the contract labor provisions.

8-104G Work Performed by Specialists

An independent firm that furnishes a special service or performs work of a specialized nature is considered to be a "subcontractor" with respect to the labor provisions.

Work performed by specialty firms is subject to all contract labor requirements, regardless of the nature of the work, service, or method of payment.

8-104H Engineering Consultants, Materials Testers, and Land Surveyors

All firms that furnish engineering services such as construction inspection, materials testing, and land surveying, at the job site regardless of whether that firm is hired by the contractor or Caltrans, is subject to California labor code prevailing wage requirements. The payment of prevailing wage rates is mandatory.

8-105 Classification of Labor and Wage Rate Determinations

8-105 Classification of Labor and Wage Rate Determinations

Labor standards require the proper classification and payment of workers for the work they actually perform. To meet these standards, the contractor and persons or firms performing the work on the project must:

- Use only the classification and nomenclature listed in the wage determination decision or prevailing wage rate determination applicable to the contract.
- Use classifications that describe the work being performed. For example, if carpenters are used to place reinforcing steel, they should be shown as "ironworkers" and paid accordingly.
- Maintain an accurate record of the time spent in each work classification, and show this time by means of separate entries in the payroll records and on the certified payroll.

A single worker may perform many different tasks covered by more than one craft or classification during the course of a single day. In this situation, the contractor may break up the work into the different classification and pay accordingly or it may pay the worker the highest applicable wage rate for the entire day. If the highest wage rate is paid for the entire day, separate entries in the payroll records are not required.

Since most construction work is performed by recognized craft classifications, prevailing practice in the industry and union rules will usually determine the proper classification. Workers must be classified and paid according to the work they actually perform, regardless of union affiliation, other titles, or designations.

Occasionally, the wage rate may not be provided in the federal wage determinations for a particular labor classification. When this occurs, the workers should be reclassified, if possible, to a comparable classification. If it is not possible to reclassify the work, contact the district labor compliance officer and request that a wage classification be determined. A wage survey, collective bargaining agreements, local prevailing practice and the contractor's previous experience with similar work will be considered in reaching this determination.

To request wage rate determinations on federal-aid contracts, use United States Department of Labor Form SF-308, "Request For Wage Determination and Response to Request," To request federal wage rates, consult the Division of Construction labor compliance unit.

In no case may a construction contract be considered effectively amended until a response has been received from the Department of Labor indicating approval of the proposed classification or reclassification requests.

8-105A Prevailing Wage Requirements

In most cases, the wage rates as determined by the California Department of Industrial Relations and the United States Department of Labor will be the same for any given labor classification. If there is a difference between Department of Labor wage rates and Department of Industrial Relations wage rates for similar classifications of labor, the contractor must pay the higher wage rate.

When there is an error in the published rate, the district should notify the Division of Construction labor compliance unit. They will contact the Department of Industrial Relations or the Department of Labor, depending on which agency's rate is in error. Corrections will be made in accordance with Section 16206, "Corrections," of the California Code of Regulation.

8-105B Special Wage Determinations

The state general prevailing wage rates contain most crafts and classifications of workers required on Caltrans projects. Occasionally, however, a unique labor classification may be anticipated for future state-funded major construction projects or for minor or miscellaneous service contracts, but are not listed in the general prevailing wage rates. In this situation, the district labor compliance officer must obtain a special wage determination from the Department of Industrial Relations.

To initiate the request, the district labor compliance officer must prepare a memorandum to the Division of Construction labor compliance unit, describing the following:

- Job duties and the nature of the work
- The locality (county) where the work is to be performed
- The anticipated advertisement and award dates
- A list of contractors or employers, including complete addresses and telephone numbers, who perform work of a similar nature within the same geographical area
- The most recent determination number of any prior requests

The Division of Construction labor compliance unit will forward the request to the Department of Industrial Relations, Division of Labor Statistics and Research (DLS&R). DLS&R will prepare a special wage determination and send it to the

Division of Construction labor compliance unit. The Division of Construction labor compliance unit will send the special wage determination by cover memo to all district labor compliance officers for appropriate handling or future reference.

In case of a jurisdictional dispute, such as a dispute between cement masons and operating engineers, a non-signatory contractor may pay either wage rate, as long as it is recognized by the Department of Industrial Relations.

8-105C Supervisory and Managerial Personnel

As a general rule, when administering the prevailing wage requirements, those employees whose work is supervisory or non-manual in nature are not considered as laborers or mechanics. However, just because an employee is paid a salary or is called a foreman does not mean that the person is not a laborer or mechanic.

If a supervisor, regularly and for a substantial period of time, performs journeyman work, then that supervisor is subject to the prevailing wage requirements of the contract.

If the time that the supervisor performs the work of a journeyman is negligible and does not establish a definite pattern, that supervisor's entire employment should be considered supervisory and not subject to prevailing wage requirements.

8-105D Corporate Employees as Officers and Directors

A corporation is a single legal entity represented by the corporate officers acting pursuant to the corporate bylaws and applicable state law.

Any corporate officer that works on a project as a laborer or mechanic, regardless of an employment relationship to the corporation, must be paid not less than the prevailing hourly wage rates established for the type of work performed.

The only exception is when corporate officers act in a supervisory capacity and do not perform the function of a workman or laborer.

8-105E Employment of Apprentices

The California Labor Code limits payment of apprentice wage rates to persons registered as apprentices in an approved apprenticeship training program with the Department of Industrial Relations, Division of Apprenticeship Standards (DAS).

An apprentice who is not so registered is not "properly indentured" within the meaning of the term as it is used in the State Labor Code and the *Standard Specifications*. Under the provisions of the contract, a non-indentured apprentice is not considered to be an apprentice and must be paid the journeyman wage rate for their classification.

For each project, the contractor is required to furnish evidence of its apprentices' registration. This evidence must be on a Division of Apprenticeship Standards Form DAS-1, "Apprenticeship Agreement," or a letter giving notice of registration from the Division of Apprenticeship Standards (DAS). Either Form DAS-1 or a letter from the Division of Apprenticeship Standards is acceptable evidence of apprentice registration.

If an apprentice is scheduled to work on the project before the contractor receives evidence of registration, the district labor compliance officer must telephone the nearest Division of Apprenticeship Standards (DAS) office and confirm proper registration.

This procedure will expedite the verification of apprentices but does not preclude the obligation of the contractor to supply written evidence of the apprentice's registration and to satisfy the state requirements and Section 1777.5 of the California Labor Code.

In addition to evidence of registration in its program, the contractor is required to use the appropriate apprentice-journeyman ratios and wage rate percentages, as addressed in state prevailing wage determinations and contractor's union agreements.

Section 1777.5 of the State Labor Code requires the contractor to contribute the training fund portion of the fringe benefit to the appropriate apprentice trust fund or to the Division of Apprenticeship Standards (DAS), California Apprenticeship Council.

8-105F Partial Coverage

Contractors or subcontractors who are engaged in more than one Caltrans construction project at a time may use the same employees on two or more projects during a given work-week. Separate certified payrolls must be provided for individual contracts.

8-106 Labor Compliance Case Write Ups

8-106 Labor Compliance Case Write Ups

After investigating the facts and determining that an apparent labor compliance violation has occurred, the district labor compliance officer will determine the amount of penalty assessment and wage restitution due from the contractor. The district labor compliance officer must document findings on forms CEM-2506, "Labor Compliance -Wage Violation," and CEM-2507, "Labor Violation: Case Summary." Use Form CEM-2506 to record applicable data for each worker who was underpaid on a Caltrans contract. Use Form CEM-2507 to summarize the data on the CEM-2506 and to provide a chronological record of the case. State labor compliance violation cases must be documented to include:

- A description of the facts and evidence collected to build the labor compliance violation case
- A spreadsheet showing a summary of wages and penalties due each employee
- Evidence provided by and statements made by the contractor
- An analysis of the facts
- A Case History
- Recommendations to the Department of Industrial Relations.

Forms CEM-2506 and CEM-2507 are sufficient documentation for assessing penalties and withholding back wages due employees for federal wage case violations. Attach Forms CEM-2506, CEM-2507, CEM-2508, "Contractor's Payroll Source Document Review," CEM-2509, "Checklist - Source Document Review," a case history, and applicable correspondence with the contractor to a cover letter when forwarding cases to the Division of Construction labor compliance unit with the district's recommendations.

8-106A (1) Withhold of Funds Hearing

Legal authority to withhold funds from the contractor for labor compliance violations is provided by Title 8, "Industrial Relations," California Code of Regulations, Section 16410, "Definitions," through 16414, "Hearing."

Caltrans must provide written notice to the contractor and to any affected subcontractor of the withholding, retention, or forfeiture. The notice must contain the following information:

- The amount to be withheld, retained, or forfeited.
- A short statement of the factual basis as to why the funds are to be withheld, retained, or forfeited. Include the computation of any wages found to be due and the computation of any penalties assessed under the California Labor Code Section 1775.
- Notice of the right to request a hearing and the manner and time within which a hearing must be requested.
- Notice that penalties can be recovered by the prime contractor from an offending subcontractor.
- The notice must be sent by certified mail to the last know address of the contractor and the offending subcontractor.
- Once the notice has been provided to the contractor and offending subcontractor, Caltrans will withhold enough money to cover wage restitution and penalties as stated in the notice.

A contractor or offending subcontractor may request a hearing by sending a letter postmarked within 30 days of the date of the mailing of the notice described above to the awarding body and to the Department of Industrial Relations, Division of Labor Standards Enforcement.

The contractor must supply to the Division of Labor Standards Enforcement a statement of all factual and legal grounds upon which the contested withhold is based and must identify the specific elements and issues being contested.

Upon receipt of a timely hearing request, the Division of Labor Standards Enforcement must, within 30 days, hold a hearing to determine whether reasonable cause exists to withhold and retain funds identified in the written notice.

The hearing may be continued at the request of the party seeking the hearing upon a showing of good cause. Neither the Department of Industrial Relations nor Caltrans can request a continuance.

8-107 Debarment of Contractors

8-107 Debarment of Contractors

8-107A State

The Department of Industrial Relations, Division of Labor Standards Enforcement, (DLSE) has the authority to debar contractors from bidding on public works projects. Caltrans, through its approved labor compliance program, does not directly investigate the contractor for debarment; however Caltrans can prepare a written complaint requesting the debarment of a contractor. This complaint is forwarded to the Department of Industrial Relations for a final debarment determination. Anyone may file a debarment complaint, including an individual party.

A debarment order may be taken against a contractor or any subcontractor. The intent of the law is to debar and prevent contractors who have committed any violation with the intent to defraud or have committed more than one willful violation within a three-year period from bidding on public works projects.

The requirements and procedures for debarment can be found in Section 1777.1, "Penalties for Willful Violations of Chapter; Notice; Hearing," of the California Labor Code. Additional legal authority to debar contractors can be found in Title 8, "Industrial Relations," of the California Code of Regulations.

8-107B Process for Filing a Debarment Compliant

The district labor compliance officer may request the Division of Construction labor compliance unit to file a complaint for Caltrans with the Department of Industrial Relations Division of Labor Standards Enforcement. The following information should be provided:

- An individual case summary of all district labor compliance enforcement actions.
- A summary of prevailing wage cases filed against the contractor.
- Dollar amount of all withholds taken and penalties assessed.
- Status of whether the cases were approved by the labor commissioners office.

Each district labor compliance officer will maintain a "Caltrans labor compliance debarment log" showing the dates of complaint preparation, when forwarded to the Division of Construction labor compliance unit, and when sent to the Department of Industrial Relations for a final decision.

The investigation and final determination for debarment rests solely with the Department of Industrial Relations, legal office and the Division of Labor Standards Enforcement. Final determinations will be forwarded to complainant and the awarding body.

8-107C Federal Suspension and Debarment

Suspension and debarment apply to all federal-aid highway construction projects and are discretionary administrative actions taken to protect the federal government by excluding persons from participation in the federal assistance programs.

A suspension and debarment action ensures that the federal government does not conduct business with a person who has an unsatisfactory record of integrity and business ethics. The suspension and debarment actions are administered government wide; consequently, a person excluded by one federal agency is excluded from doing business with any federal agency.

8-108 Summary of Labor Compliance Law, Act, and Statute

8-108 Summary of Labor Compliance Law, Act, and Statute

The following section provides an overview and content summary of labor compliance law, acts, and statutes.

8-108A Federal Law

8-108A (1) Copeland Act

- Full wages earned must be paid.
- Deductions from wages must be authorized.
- Proper payroll records must be kept for a period of three years after contract completion.
- Statements of compliance must be submitted weekly by the prime contractor and all persons or firms performing work on the contract.

8-108A (2) Prevailing Wage Provisions of Davis-Bacon Act.

- Wages paid to laborers and mechanics must not be less than the predetermined hourly rates (including fringe benefits) shown in the appropriate wage schedule.
- Laborers and mechanics must be properly classified and paid according to the work actually performed.
- Laborers and mechanics must be paid at least once a week.
- The prevailing wage schedule, including fringe benefits and supplements (which can be the one printed in the contract proposal), and the minimum wage poster must be posted in a prominent place at the project site.

8-108A (3) Work Hours Act of 1962

- Forty hours is the standard workweek. Any work over this limit must be compensated at no less than one and one-half times the basic hourly wage rate paid.
- The contractor is liable to employees for unpaid wages.
- The contractor is liable to the federal government for liquidated damages of $10 per day per worker for each violation of the provisions of this act.
- In the event of violations of the provisions of this act, the state may withhold from the progress pay estimate sufficient money to guarantee unpaid wages and liquidated damages.
- Intentional violations are a federal misdemeanor ($1,000 fine and/or six months' imprisonment.)

8-108A (4) False Information Act

- The making or use of false statements is a felony ($10,000 fine and/or five years' imprisonment).
- The false statement poster shall be posted at one or more places where it is readily available to all personnel concerned with the project.

8-108B State Law

Following are some of the more frequently cited California Labor Code sections:

Sections 213, "Limitations Upon Effect and Applicability of Section 212," and 224, "Withholding or Diverting Portion of Wages Under Law or Written Authorization' (Employee authorization to withhold portions of the employees wages).

Section 1729, "Withholding Sums by Contractor From Subcontractor; Recovery of Penalty From Subcontractor" (Holds the subcontractor liable for failure to comply with the prevailing wage requirements).

Section 1771.5, "Labor Compliance Program" (Excludes construction work with a value of $25,000 or less and alteration, demolition, repair, or maintenance projects with a value of $15,000 or less from the prevailing wage requirements).

Section 1774, "Payment of Not Less Than Specified Prevailing Rates to Workmen" (Requires all workers be paid not less than the specified prevailing wage rate).

Section 1775, "Forfeiture For Paying Less Than Prevailing Rate; Rights of Workers" (Requires that penalties be assessed against the contractor for failure to pay employees prevailing wages).

Section 1776, “Payroll Record of Wages Paid; Inspection; Forms; Effect of Noncompliance; Penalties” (This section requires the contractor and subcontractor to keep accurate records of wages paid, specifies which persons and under what circumstances these records may be inspected, and provides penalties for failure to comply).

Section 1777.1, “Penalties For Willful Violations of Chapter; Notice; Hearing” (Allows the contractor to pursue a hearing process through the Department of Industrial Relations on a wage violation case).

Section 1777.5, “Employment of Apprentices on Public Works,” and 1777.6, “Prohibited Discrimination in Employment of Apprentices” (These sections pertain to apprenticeship standards and ratios, and nondiscrimination).

Section 1778, “Taking or Receiving Portion of Wages of Workmen or Working Subcontractor as Felony” (This section prohibits misuse of another person’s wages. This is the only section of the labor code that can result in a felony conviction).

Section 1779, “Charging Fee for Registration, Giving Information, or Placing or Assisting and Placing Person in Public Work as Misdemeanor” (This section prohibits a fee for employing a person in public works).

Section 1780, “Placing Order for Employment Where Fee or Valuable Consideration Involved as Misdemeanor” (This section prohibits a fee for placing an order for employment on public works).

Section 1810, “Hours Constituting Day’s Work; Stipulation in Contracts” (Eight hours constitutes a legal day’s work).

Section 1811, “Limitation as to Hours of Service; Exception” (Restricts work to eight hours per day and 40 hours per calendar week without overtime compensation).

Section 1812, “Record of Hours Worked; Availability for Inspection” (Requires contractor to keep accurate records of hours worked and have records available for inspection by the awarding body).

Section 1813, “Penalty When Workman Required to Work Excess Hours; Stipulation in Contract; Cognizance and Report of Violations” (Provides penalties for violations of provisions of Sections 1810-1815 by any contractor).

Section 1814, “Violation of Article or Noncompliance With Section Requiring Records of Hours Worked as Misdemeanor” (Provides that persons violating provisions of Sections 1810-1815 are guilty of a misdemeanor).

Section 1815, “Work Performed in Excess of Specified Hour Limitations; Compensation” (Provides overtime payment for hours of work in excess of eight hours per day or 40 hours per calendar week).

Section 2750.5, “Rebuttable Presumption That Contractor is Employee Rather Than Independent Contractor; Proof of Independent Contractor Status” (This section essentially says that a worker is presumed to be an employee unless proven to be an independent contractor).

Section 2 Equal Employment Opportunity

8-201 General

8-202 Laws, Regulations, and Specifications

8-203 Preconstruction Conference

8-204 Reports to Other Agencies

8-205 On-Site Interviews

8-206 Federal-Aid Project Equal Employment Opportunity Posters

8-207 Employee Complaints - Discrimination Complaint Processing

8-208 Contracts Containing "Federal Requirements Training Special Provision"

8-209 Deducting Payment for Failure to Submit Reports

Section 2 Equal Employment Opportunity

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8-201 General

8-201 General

This section presents the guidelines for administration of the nondiscrimination and equal employment opportunity provisions of the contract. The total equal employment opportunity program is complex and involves functional units outside of construction. The guidelines in this section apply primarily to activities and responsibilities resulting from contractual requirements and are not necessarily complete insofar as the total responsibilities and activities for either Caltrans or the contractor.

8-202 Laws, Regulations, and Specifications

8-202 Laws, Regulations, and Specifications

California requirements for public works contractors on the subjects of nondiscrimination and equal employment opportunity are located in the Government Code, Sections 12990 and following, and in the regulations of the Fair Employment and Housing Commission in Title 2, California Code of Regulations, Sections 8100, "Contractor Nondiscrimination and Compliance," and following. Section 7-1.01A(4), "Labor Nondiscrimination," of the *Standard Specifications*, and the "Fair Employment Practices" section of the contract special provisions call the contractor's attention to these and other requirements. Federal requirements which apply to contracts of federal-aid construction projects are located in the "Equal Employment Opportunity" sections of the contract special provisions. Under the terms of the contract, the contractor has responsibility for compliance by its subcontractors.

8-203 Preconstruction Conference

8-203 Preconstruction Conference

Either the resident engineer or the district labor compliance officer must cover the equal employment opportunity and fair employment practices provisions of the contract at the preconstruction conference. See Section 5-0, "Conduct of the Work," of the *Construction Manual* (manual) for details on preconstruction conferences.

8-204 Reports to Other Agencies

8-204 Reports to Other Agencies

Contractors and certain subcontractors are required by terms of the contract to submit information and reports directly to the United States Department of Labor's director, Office of Federal Contract Compliance Programs, and to the administrator, Office of Compliance Programs, California Department of Fair Employment and Housing. Normally, there will be no copies of these reports sent to Caltrans. Contractors are also required by law to send notices of their status as equal employment opportunity employers to the labor unions or other worker organizations with which they have agreements.

8-205 On-Site Interviews

8-205 On-Site Interviews

District labor compliance officers or project personnel are to conduct on-site interviews with employees of the contractor and subcontractors. The interviews are to be recorded on Form CEM-2504, "Employee Interview: Labor Compliance / EEO."

These interviews are done in conjunction with the labor compliance interviews as a means to verify that the contractors and subcontractors are in compliance with the equal employment opportunity and the labor nondiscrimination contract provisions as mandated by state and federal statutes and regulations.

When an employee's response to the equal employment opportunity questions in Form CEM-2504 indicate possible irregularities, then a copy of that interview must be forwarded from the district labor compliance officer to the Division of Construction labor compliance unit for further action.

8-206 Federal-Aid Project Equal Employment Opportunity Posters

8-206 Federal-Aid Project Equal Employment Opportunity Posters

Check to see that the contractor has posted the company's equal employment opportunity policy at each construction location as required by the specifications. The contractor must also post the "Equal Employment is the Law" poster as specified in the contract. This poster will be furnished at the preconstruction conference.

The district labor compliance officer will verify that these posting are posted at off site locations during source document reviews. If the contractor is found to be in noncompliance the district labor compliance officer will provide additional posters to affect compliance. The district labor compliance officer will then write a memo to the resident engineer for inclusion in the project file, advising the resident engineer of the contractor's compliance status.

The "Equal Employment Opportunity is the Law" poster must also be posted in the resident engineer's office.

8-207 Employee Complaints - Discrimination Complaint Processing

8-207 Employee Complaints - Discrimination Complaint Processing

While the overall equal employment opportunity program and responsibility rests with Civil Rights, enforcement of equal employment opportunity contract provisions rests with district construction and the Division of Construction. The resident engineer should be aware of the general civil rights requirements of the contract.

When a contractor's employee lodges a complaint concerning the equal employment opportunity or fair employment practices provision of the contract, the resident engineer is to notify the district labor compliance officer. The district labor compliance officer or resident engineer will conduct an employee interview with the complainant and complete a Form CEM-2504, "Employee Interview: Labor Compliance / EEO." The district labor compliance officer will present the complainant with a copy of the flyers: *Department of Fair Employment and Housing's A Guide For Complainants* and the United States Equal Employment Opportunity Commission's *Filing a Charge*. The district labor compliance officer will forward a copy of the Form CEM-2504 to the Division of Construction labor compliance unit. The complaint will be logged and tracked by the Division of Construction. The labor compliance unit will forward a copy of the interview (alleged complaint) to Civil Rights. Within 2 business days the district labor compliance officer will prepare and send a letter to the prime contractor with a copy to Civil Rights that an employee has alleged a discrimination complaint and that the employee was given notice of their proper recourse. The employee's name shall not be divulged unless the employee gives permission. Further district construction actions should only be taken upon the advice and guidance of the Division of Construction.

8-208 Contracts Containing "Federal Requirements Training Special Provision"

8-208 Contracts Containing "Federal Requirements Training Special Provision"

The training special provision is used on federal-aid projects whenever it is determined that the project is of sufficient size and duration to support full training periods.

Apprentices, in almost all cases, are employed under programs approved by the Division of Apprenticeship Standards; therefore, it will not be necessary to have contractors submit a separate program. Contractors are required to submit to the district evidence of approval from the Division of Apprenticeship Standards to train apprentices.

Under the contract, the contractor has agreed to provide each trainee or apprentice with a certification showing the type and length of training satisfactorily completed.

Before the work involving the trainee or apprentice begins, the resident engineer must write a contract change order as specified in the special provisions to provide the appropriate compensation for the trainees. The total amount of this contract change order should reflect the contractors plan for use of trainees. No markup will be applied to the specified hourly rate.

When a trainee quits the project, the contractor is to state the reason why the apprentice left.

8-209 Deducting Payment for Failure to Submit Reports

8-209 Deducting Payment for Failure to Submit Reports

The authority for initiating a deduction is contained in the special provisions, Section 14, "Federal Requirements for Federal-Aid Construction Projects," of federal-aid construction contracts. Equal employment opportunity deductions should be made in those situations when the contractor or subcontractor fail to submit the required training plans, fail to post the necessary equal employment opportunity posters, or when the contractor or subcontractor fail to provide the Form FHWA-1391, "Federal-Aid Highway Construction Contractors Annual EEO Report."

Contractors found in noncompliance are to be advised, in writing, of the specific deficiencies prior to making a deduction.

Section 3 Disadvantaged Business

8-301 General

8-302 Specifications, Regulations and Statutes

8-303 Monitoring and Enforcement Activities During Construction

8-303A DBE and DVBE Listing
8-303B Subletting and Subcontracting Listing Versus DBE and DVBE Listing
8-303C When the Listed DBE or DVBE Does Not Perform the Work
8-303D Monthly DBE Trucking Verification on Federal-Aid Contracts
8-303E Prompt Payment Clauses
8-303F Final Report, Use of DBE or DVBE, First-Tier Subcontractors
8-303G Disadvantaged Business Enterprises Certification Status Change (Federal-Aid Contracts)

8-304 Adding, Removing, or Substituting DBE or DVBE Subcontractors

8-304A Adding DBEs or DVBEs
8-304B Removing and Substituting DBEs or DVBEs

8-305 Caltrans Civil Rights

8-306 Example 8-3.1 Second Notice, Contractor Has Failed To Respond to Verbal Notice on Nonuse of DBE

Section 3 Disadvantaged Business

Section 3 Disadvantaged Business

8-301 General

8-301 General

Caltrans' policy is to ensure equal opportunity in the award and performance of its contracts. Part of this policy involves a program designed to increase the use of disadvantaged business enterprises (DBE) on federally funded contracts and disabled veteran business enterprises (DVBE) on state-funded construction contracts.

For the overall Caltrans federally assisted program, Caltrans establishes an annual participation goal by DBEs. Federal regulations define DBEs as firms owned and controlled by individuals who are both socially and economically disadvantaged. Additionally the state has adopted regulations that call for the use of project goals for DVBEs. The DVBE is a state-mandated opportunity program for disabled veterans and applies to contracts financed solely with state funds.

Caltrans Civil Rights evaluates projects to be advertised and, as appropriate, assigns separate goals for DBEs and DVBEs. Although one overall Caltrans goal exists for DBE participation, individual contract goals will vary. The advertisement specifies individual contract goals. Goals are set based upon the type of work and the availability of DBE and non-DBE subcontractors to participate in the bidding process in the geographical area of the contract. DVBE participation goals are 3 percent on all state-funded projects.

For every advertised contract containing goals, the contractor must submit information to Caltrans regarding the proposed use of DBEs or DVBEs. Civil Rights evaluates this information to see if the contract goal has been met or if a good faith effort to use DBEs or DVBEs has been made. If the low bidder has not met the contract goal or shown good faith efforts, the contract may be awarded to the next low bidder that meets these requirements. Once a contract is awarded, the bidder's statement of intent or good faith effort is a commitment that becomes a contract requirement.

Projects funded only by the state have no specific requirement for the use of DBEs. Likewise, projects funded only by the federal government have no specific requirement for the use of DVBEs. DBEs and DVBEs are not interchangeable Consequently, projects funded only by the state cannot use a DBE to make the goal, and projects funded only by the federal government cannot use a DVBE to make the goal.

Some contracts do not have DBE or DVBE goals. However, Caltrans does encourage the use of DBEs and DVBEs on these contracts, and the bidders are urged to obtain DBE or DVBE participation.

8-302 Specifications, Regulations and Statutes

8-302 Specifications, Regulations and Statutes

Federal regulations require the DBE program, and state laws require the DVBE program. The special provisions for each contract contain the Caltrans DBE or DVBE requirements. Some contracts will have established goals; others will contain a statement urging the contractor to use DBE or DVBE firms to the maximum extent

possible. Specific restrictions exist regarding the removal and replacement of both DBEs and DVBEs listed on the contractor's utilization plan at the time of project award. DBE or DVBE requirements are in addition to the requirements of Section 4100 of the Public Contract Code, "Subletting and Subcontracting Fair Practices Act," described in Section 3-801C, "The Subletting and Subcontracting Fair Practices Act," of the *Construction Manual* (manual).

8-303 Monitoring and Enforcement Activities During Construction

8-303 Monitoring and Enforcement Activities During Construction

The following procedures are to be used in the monitoring and enforcement of the subcontracting, DBE or DVBE requirements and the prompt payment clauses of the special provisions. This section contains several forms or listings that should be compared against each other and analyzed for accuracy.

8-303A DBE and DVBE Listing

The resident engineer will receive the approved list of DBEs or DVBEs listed by the bidder for project award. If the list has not been provided or is incomplete, the resident engineer must contact the district labor compliance officer to have it available before the preconstruction conference. The approved list is based on the information the contractor submitted before, and as a condition of, contract award. Remember that the percentage specified in the original contract advertisement may differ from the approved listing, which is a specific contract commitment from the contractor.

The resident engineer must monitor subcontractor use to ensure the contractor uses the DBEs or DVBEs listed. At the preconstruction conference, review the list with the prime contractor and other attending parties. Unless the work is performed or supplied by the listed DBEs or DVBEs, contractors are not entitled to any payment for work or materials.

On federal-aid projects, if the contractor did not commit to using DBEs, monitoring or enforcement activities are not required. However, at contract completion, the contractor must submit Form CEM-2402 (F), "Final Report – Utilization of Disadvantaged Business Enterprises (DBE), First – Tier Subcontractors," and Form CEM-2403 (F), "Disadvantaged Business Enterprises (DBE) Certification Status Change." If the form is not submitted, a $10,000 deduction for non-compliance will be taken on the contract after acceptance. On contracts funded solely with state funds, if the contractor did not commit to using DVBEs, monitoring or enforcement activities are not required. However, the contractor must still submit Form CEM-2402 (S), "Final Report – Utilization of Disabled Veteran Business Enterprises (DVBE)."

8-303B Subletting and Subcontracting Listing Versus DBE and DVBE Listing

Do not construe the listing of DBE or DVBE subcontractors as a request to subcontract or a notice of intent to subcontract as required by Section 8-1.01, "Subcontracting," of the *Standard Specifications*. However, the listing does equate to a commitment from the contractor to meet the DBE or DVBE use requirements of the contract. In those instances where a DBE or DVBE subcontractor exceeds the dollar figure threshold specified in the subletting and subcontracting law (half of 1 percent of the total bid or $10,000, whichever is greater), the DBE or DVBE must also be listed on the "list of subcontractors." Conversely, a DBE or DVBE whose value of work falls below the subletting and subcontracting law threshold will not be listed on the list of subcontractors, per the subletting and subcontracting law. Because the DBE or DVBE may not be on the list of subcontractors in this instance, the DBE or DVBE listing and list of subcontractors may not match. First tier subcontractors listed on the contractor's DBE or DVBE use plan must be listed on Form CEM-1201, "Subcontracting Request."

The contractor can use additional DBEs or DVBEs by following the standard subcontractor or supplier requirements of the contract, taking into consideration the requirements of the Subletting and Subcontracting Fair Practices Act. The contractor cannot, however, eliminate a DBE or DVBE from the approved DBE or DVBE use plan without written Caltrans' approval to do so, even if the work must be done with the contractor's own forces. For the procedures for handling contractor's requests for changes, see Section 8-304, "Adding, Removing, or Substituting DBE or DVBE Subcontractors," of this manual and Section 3-8, "Prosecution and Progress," of this manual. To check for irregularities, the resident engineer will compare the subcontractors and contract items listed on Form CEM-1201 with the contractor's DBE or DVBE use plan and the Subletting and Subcontracting listing.

8-303C When the Listed DBE or DVBE Does Not Perform the Work

The DBE or DVBE use plan furnished by the contractor, together with any authorized changes made during the life of the contract, provides the resident engineer with a listing of work to be done or materials to be furnished by specific DBEs or DVBEs. If Caltrans personnel observe that any other businesses than the listed ones are doing the work or providing the materials, promptly notify the contractor in writing that an apparent violation is taking place. If you make an initial verbal warning, note this fact in the resident engineer's daily report. Also, for this work, hold an administrative deduction on the next estimate in the amount listed on the DBE or DVBE use plan.

If the first notice is ineffective for any reason, send another written notice describing the violation to the contractor. Include a warning that failure to comply with the DBE or DVBE contract requirements will result in a withhold in the amount of the item of work(s) listed or in contract termination. For a sample copy of such a letter, see Example 8-3.1, "Second Notice, Contractor Has Failed to respond to Verbal Notice on Nonuse of DBE," at the end of this section.

If the written notice fails to achieve results, the resident engineer will submit to the district labor compliance office a memorandum noting the following:

- The apparent violation
- Any verbal action taken
- The contractor's subsequent action or inaction
- A copy of the written notice previously sent to the contractor

The district labor compliance construction office should review for consistency the actions taken and then forward this documentation to the Division of Construction labor compliance unit and the construction field coordinator. Include any district recommendations for action. The Division of Construction will notify Civil Rights. When necessary, Civil Rights will investigate the apparent violation and notify the federal authorities as appropriate. This process applies to federal DBE and state DVBE funded projects.

The actions described above are in addition to any that must be taken for violations of the subcontracting provisions of the *Standard Specifications* and of the Subletting and Subcontracting Fair Practices Act.

8-303D Monthly DBE Trucking Verification on Federal-Aid Contracts

When DBE trucking is listed as a goal on the DBE use plan, the contractor must submit to the resident engineer Form CEM-2404 (F), "Monthly DBE Trucking Verification," before the 15th of each month. The form must show the following:

- The truck owner's name
- The California identification (CA) number issued by the California Highway Patrol
- The truck owner's DBE certification number
- The company name and address
- The commission or amount paid
- The date paid
- The lease arrangement

If the prime contractor fails to submit the form, the resident engineer must make on the monthly pay estimate an administrative deduction for missing documents.

In determining how much credit percentage to allow for the trucking company toward the DBE contract goal, use the following factors:

- The listed DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
- The DBE receives credit for the total value of the transportation services it provides on the contract, using trucks it owns, insures, and operates and using drivers it employs.
- The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE that leases trucks from another DBE firm receives credit for the total value of the transportation services the lessee DBE provides on the contract.
- The DBE may also lease trucks from a non-DBE firm or a non-DBE owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee because a DBE is not providing these services.
- A lease must indicate that the DBE has exclusive use of and control over the truck. This provision does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. (Generally, the lease must be long term and not for the specific project.)

To document and confirm compliance, the resident engineer or assistant resident engineer must track the trucks in a daily report or by other means.

8-303E Prompt Payment Clauses

The prompt payment clauses of the special provisions must be emphasized during the preconstruction conference and enforced during construction.

The prompt return of retention payments applies only to federal-aid contracts. Federal regulations do not require the resident engineer to monitor prompt payments status. However, at the completion of the contract, the prime contractor must document the date of final payment to each first-tier subcontractor and all DBE firms on Form CEM-2402 (F), "Final Report—Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors."

8-303F Final Report, Use of DBE or DVBE, First-Tier Subcontractors

The specifications require the contractor to submit to the resident engineer either Form CEM-2402 (F), "Final Report – Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors," or Form CEM-2402 (S), "Final Report – Utilization of Disabled Veterans Business Enterprises (DVBE) (DVBE)," upon completion of the contract. These forms, "the final DBE or DVBE reports," provide key information required to initiate project closure and payment.

During the contract, the contractor must maintain information regarding assignments to all first-tier subcontractors and all DBE or DVBE firms, regardless of tier. When filling out the final DBE or DVBE report, the contractor must include the following information:

- The names and addresses of these firms
- The date each of these firms completed its portion of the work
- The date of final payment to these firms
- The total dollar figure paid to each firm
- All actual expenditures (not the contract item prices) paid to DBEs or DVBEs
- Any lower-tier DBEs or DVBEs that were used, even if the firms were not originally listed in the bid submittals for the purposes of goal attainment

If the prime contractor is a DBE or DVBE firm, the records must also show the date of work performed by its own forces, along with the corresponding dollar value of the work claimed toward DBE or DVBE goals.

The resident engineer must compare the contractor's original dollar commitment with the final attainment shown on the final DBE or DVBE report. The resident engineer must also verify that the dollar amount reflects the actual dollar value paid to each DBE or DVBE firm. This verification should include any changes made in planned work scheduled for each DBE or DVBE firm.

If any question exists concerning the report's accuracy, require a written explanation from the contractor. This narrative report must explain any differences between the initial plan and the final summary, unless the contractor's comments on the final DBE or DVBE report are in sufficient detail to provide the explanation. Examples of items the contractor would need to explain in writing include why the names of lower-tier subcontractors, the work items, or dollar figures do not match the contractor's initial plan. Attach the narrative report to the final DBE or DVBE report. The resident engineer must review the completed final DBE or DVBE report for completion and accuracy before signing.

The narrative report is not required for projects that do not have specific percentage goals for DBE or DVBE participation or final projects that show no change from the DBE or DVBE use plan.

If a DBE or DVBE substitution is made during the project, the prime contractor must make good faith efforts to substitute another DBE or DVBE for the original DBE or DVBE to the extent needed to meet the contract goal. If the contractor's DBE or DVBE attainment falls short of the contract goal, hold only the amount of contract funds necessary to meet the contract goal.

If the contractor does not attain the original goal for reasons beyond their control, then no funds should be withheld. For example, if a contract change order eliminates all or a portion of an item originally designated to be performed by a DBE or DVBE, this situation is beyond the contractor's control. Therefore, no funds should be withheld. Conversely, if a contract change order increases the work allocated to a DBE or DVBE, the contractor is not required to have the DBE or DVBE perform the work, but should be encouraged to do so.

If the contractor does not submit Form CEM-2402(F), "Final Report—Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors," upon completion of a federally funded contract, the specified deduction must be taken on the after acceptance estimate. This deduction can be executed by entering an "equal employment opportunity" (EEO) code in Part 2, "Deductions," of Form CEM-6001, "Project Record—Estimate Request." A value of $10,000 must be entered in the "amount" field of this form. Upon satisfactory completion and submittal of the outstanding report, the money will be returned to the contractor.

The final DBE or DVBE report (together with the contractor's narrative) must be sent to the district and then forwarded to the Division of Construction.

For how to handle the proposed final, semifinal, and final estimates, see Section 3-9, "Measurement and Payment," of this manual.

<u>8-303G Disadvantaged Business Enterprises Certification Status Change (Federal-Aid Contracts)</u>

Federally funded contracts require the contractor to report a DBE firm that becomes certified or decertified during the course of the project. A DBE subcontractor that becomes decertified during the course of the project must notify the contractor in writing with the date of decertification. In the same manner, a subcontractor that becomes a certified DBE during the course of the project must notify the contractor in writing with the date of certification.

The prime contractor must notify the resident engineer if the contractor becomes aware of a DBE obtaining or losing its certification during construction. To document and report such changes, the contractor must complete Form CEM-2403 (F), "Disadvantaged Business Enterprises (DBE) Certification Status Change." The form should list the amount of money paid to the DBE while it was certified.

The contractor must still honor contractual commitments with a DBE firm performing work on the contract even if the DBE loses its certification during construction. No substitution is required.

For federal reporting purposes only, DBE credit for Caltrans will be limited to payments made while the firm was certified. This has no effect on the Form CEM-2402(F), "Final Report—Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors" which should show the total paid to the DBE.

The contractor must submit the form at the contract's completion, regardless of any changes in DBE status. If no change in DBE status occurs during the life of the contract, the contractor must write, "no change" across the fields of Form CEM-2403(F). If the prime contractor fails to submit the form, the resident engineer must include this report as part of the "other outstanding document" (OOD) deduction when preparing the after acceptance payment.

For how to handle the proposed final, semifinal, and final estimates, see Section 3-9, "Measurement and Payment," of this manual.

8-304 Adding, Removing, or Substituting DBE or DVBE Subcontractors

8-304 Adding, Removing, or Substituting DBE or DVBE Subcontractors

The following procedures cover any changes to the DBE or DVBE listing provided by the prime contractor before award of the contract.

8-304A Adding DBEs or DVBEs

Caltrans permits and encourages the contractor to increase the amount of work to DBEs or DVBEs over what was originally listed for goal attainment. If a portion of the work will be subcontracted, the contractor must comply with Section 8-1.01, "Subcontracting," of the *Standard Specifications* and with Section 4100 of the Public Contract Code "Subletting and Subcontracting Fair Practices Act." For the procedures for subcontracting, see Section 3-8, "Prosecution and Progress," of this manual. Place a copy of the contractor's request in the project file for later reference when approving Form CEM-2402 (F), "Final Report – Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors," or Form CEM-2402 (S), "Final Report – Utilization of Disabled Veteran Business Enterprises (DVBE)."

8-304B Removing and Substituting DBEs or DVBEs

When the contractor requests that a DBE or DVBE that was listed for goal attainment be removed from the project, the following steps must be taken:

- Before performing the work, the contractor must submit a written request to the resident engineer asking for approval to remove or substitute the listed firm. The request must state the reason for the removal, and the reason must match one of the authorized situations specified in the contract's special provisions. (If the firm is a subcontractor covered under the "Subletting and Subcontracting Fair Practices Act" see Section 3-8, "Prosecution and Progress," of this manual.)

- The resident engineer must review the request to confirm the stated facts. The resident engineer must then notify the listed DBE or DVBE of the contractor's request to substitute. The listed DBE or DVBE has five days to respond. If the DBE or DVBE does not respond within five days, and the reason for the substitution conforms to one of the specified reasons, the resident engineer may approve the substitution. If the DBE or DVBE that the contractor wants to substitute objects, a hearing will be scheduled. The district construction deputy director, or the appointed designee, will preside over this hearing. Both the prime contractor and the DBE or DVBE should attend the hearing and will subsequently be advised of the results as to whether the request is approved or disapproved.

- If the contractor receives approval to substitute a listed DBE or DVBE, the contractor must attempt to replace the firm with another DBE or DVBE needed to meet the contract goal. If the contractor cannot find a replacement DBE or DVBE, the contractor must submit a description of its good faith efforts. In the situation of a good faith effort, the district construction deputy director must sign approval and authorization on Form CEM-2401, "Substitution Report for Disadvantaged Business Enterprise/Disabled Veteran Business Enterprise."

- The resident engineer may approve the request to replace the DBE or DVBE if the contractor will meet or exceed the contract goal without the disputed DBE or DVBE or if all of the following conditions are met:

  1. One DBE or DVBE is to be substituted for another DBE or DVBE, respectively. They are not interchangeable.
  2. The same items of work are involved, or if different items, the dollar value is equal to or greater than that in the original commitment.
  3. The new DBE or DVBE is certified at the time of replacement.

  A listing of certified firms is available through the district labor compliance office or Civil Rights site on the Internet at the following address: http://www.dot.ca.gov/hq/bep/

  Or, you can find the list by calling Civil Rights.

  Note that unless the new DBE or DVBE is certified, the substitution cannot be approved. An application for certification does not constitute certification.

- If the conditions above are not met, requests for approval of a replacement firm must be evaluated based on the contractor's performance of good faith efforts to find a replacement firm. Forward such requests, along with the contractor's documentation of good faith efforts, for approval by the district construction deputy director or the appointed designee. The contractor's documentation must include the following:

  1. The names and dates of each publication in which the prime contractor placed a request for DBE or DVBE participation for the project.
  2. The names and dates of written notices sent to certified DBEs or DVBEs soliciting bids for the project.
  3. The methods and dates used for following up initial solicitations to determine with certainty whether or not the DBEs or DVBEs were interested.
  4. The items of work the prime contractor made available to DBE or DVBE firms. Where appropriate, the contractor should include any breakdown of contract work items (including those items normally performed by the bidder with its own forces) into economically feasible units to facilitate DBE or DVBE participation. Essentially, the prime contractor must demonstrate that it made enough work available to the firms to meet the DBE or DVBE goal.
  5. The names, addresses, and phone numbers of both the rejected DBE or DVBE firms and the firm selected for that work, as well as the reasons for the contractor's choice.
  6. Any efforts made to assist an interested DBE or DVBE in obtaining bonding, lines of credit, or insurance. Similarly, any technical assistance or information related to the project plans, specifications, and requirements that the contractor provided to the DBE or DVBE.
  7. Any efforts made to assist interested DBEs or DVBEs in obtaining necessary equipment, supplies, materials, or related assistance or services, excluding supplies and equipment the DBE or DVBE subcontractors purchase or lease from the prime contractor or its affiliate.

8. The names of agencies contacted to provide assistance in contacting, recruiting, and using DBE or DVBE firms.

9. Any additional data to support a demonstration of good faith efforts.

- Caltrans has consultant contracts with technical services contractors on federal aid projects to provide assistance to DBE subcontractors. The resident engineer can also use the services of the technical services contractor to help gather information for the substitution process or to encourage the subcontractor to perform the work so that no substitution is necessary. The resident engineer can also encourage the prime contractor to use the services of the technical services contractor in finding replacements for DBE subcontractors. For the names and addresses of the technical services contractors, see the DBE portion of the contract's special provisions. However, the prime contractor should not use technical services contractors as its sole effort to satisfy the good faith requirement.
- The substitution request will be approved if such documentation indicates the contractor exerted a good faith effort to replace in kind the DBE or DVBE. If there is any reason to doubt the adequacy of the contractor's effort, consult the district or the Division of Construction. If the decision is not to approve the good faith efforts, the contractor must take such additional steps as are necessary to find a replacement firm. Advise the prime contractor that performance of the work without the resident engineer's prior written approval will result in an administrative deduction for the value of the work listed on the DBE or DVBE usage commitment. When the final review is complete and a decision is reached, the district will notify the resident engineer.
- The resident engineer must give the contractor written notice of the decision. Send a separate written notification to the contractor regarding substitutions covered by the Subletting and Subcontracting Fair Practices Act. Place copies of all correspondence in the project's file.
- Once the substitution has occurred, the resident engineer must prepare Form CEM-2401, "Substitution Report for Disadvantaged Business Enterprise/ Disabled Veteran Business Enterprise," and request the prime contract furnish a revised Form CEM-1201, "Subcontracting Request," if applicable.

Clearly, substitution of a listed DBE or DVBE may be a lengthy process. However, contractors are not entitled to neither time adjustments nor increased costs as a result of substituting the DBE or DVBE firm the contractor originally listed for goal attainment.

8-305 Caltrans Civil Rights

8-305 Caltrans Civil Rights

Caltrans Civil Rights develops policy related to and generally administers and oversees the DBE program for Caltrans. Additionally, among other duties, Civil Rights certifies DBEs, publishes the lists of the certified firms, and determines whether those firms meet the requirements of applicable federal regulations. The California Department of General Services certifies DVBEs, and determines whether these firms meet the requirements of applicable state regulations.

Civil Rights also sets goals, determines goal attainment during contract award and at project completion, and performs equal employment opportunity compliance reviews of Caltrans' contractors.

Although overall program responsibility rests with Civil Rights, specific construction project responsibility rests with district construction and the Division of Construction. The resident engineer must be aware of the general civil rights requirements, and when a question arises about civil rights requirements or a violation of those requirements has apparently occurred, the resident engineer must immediately notify the district construction office.

If the district needs assistance, the district must contact the Division of Construction labor compliance unit. If a complaint is received from a DBE or DVBE firm regarding treatment on the project, and the firm alleges that the claimed mistreatment is due to its DBE or DVBE status, the resident engineer must promptly notify the district labor compliance officer. If an investigation or other action is appropriate, the district labor compliance officer will make a request to the Division of Construction.

The Division of Construction will arrange for any necessary additional steps, including assistance from other functions, such as the Legal Service Center, Civil Rights, or Audits and Investigations. District construction should only take additional actions that may be necessary after receiving the Division of Construction's advice and guidance.

Example 8-3.1 Second Notice, Contractor Has Failed to Respond to Verbal Notice on Nonuse of DBE

(Enter Contract Identification)

(Current Date)

(Contractor's Superintendent,

Prime Contractor, Job Site Address)

Dear (Superintendent):

On October 27, 2000, the work on Contract Item 73, "Minor Concrete (Curb and Gutter)," apparently was being done by employees of [Name of firm]. Our records indicate that your company stated in its [DBE or DVBE] use plan that this work would be done by [Name of DBE or DVBE firm]. On October 27, I called your attention to this apparent violation of the contract; however, [Name of firm] has continued to perform work on curbs and gutters. Be advised that pursuant to the paragraph entitled "Subcontracting" in Section 5 of the contract provisions, no payment will be made for the work that was allocated to the listed subcontractor, but performed by [Name of firm].

To avoid the possibility of further consequences for violating the provisions of the contract, we suggest that you either comply with your company's original [DBE or DVBE] use plan or submit a request in writing to make a change. Any request for change must detail your company's reasons for that change, and those reasons must be one of those allowable under the contract provisions. If your request to remove the originally listed subcontractor is approved, you are further advised that you must either replace the value of work to be done by [DBEs or DVBEs] or prove that you have made a good faith effort to do so to meet the contract goal. This process can be fairly lengthy, and we urge you to immediately take such steps as are necessary. You are cautioned that we will be unable to authorize either increased costs or time due to your failure to comply with your original contractual commitment.

We are sending copies of this letter to your company's home office and to Caltrans headquarters office in Sacramento. Please contact me if I can assist you in your efforts to fulfill your contract.

Sincerely,

Resident Engineer

cc: Prime Contractor, Home Office

HQ Construction Program

District Construction Office

R. E. File

Note 1: The above letter concerns the least complicated situations in which the prime contractor is doing work planned to be sublet to a DBE or DVBE. If a second subcontractor is involved, other contract specifications are probably being violated, for instance the following:

- Standard Specifications, Section 8-1.01 "Subcontracting" --Lack of prior approval to subcontract (if federal aid) or prior notice of subcontract (state funded).
- "Section 4100 of the Public Contract Code "Subletting and Subcontracting Fair Practices Act"-- Substitutions for listed subcontractors without the engineer’s approval will result in a penalty of up to ten percent of the contract item amount.

Note 2: When subcontractor approval or notice requirements are involved, the letter to the prime contractor should refer to "subcontracting and DBE/DVBE provisions" rather than merely "DBE/DVBE provisions". When the subcontractor listing law is involved, the letter must clearly address both the "Subletting and Subcontracting Fair Practices Act." and DBE or DVBE violations.

Section 1 Local Assistance Projects and Projects Funded by Others

9-101 General

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Section 1 Local Assistance Projects and Projects Funded by Others

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9-101 General

9-101 General

This section covers the policies and procedures for the construction engineering and inspection of local assistance projects that include federal financing and projects on the state highway system that others fund. Local assistance projects can generally be described as those projects that require a cooperative agreement between a local agency and Caltrans. They also involve the expenditure of federal funds or State Highway Account funds. Projects "funded by others" (special funded programs) are those state highway projects financed with funds other than state and federal highway monies. These projects also require a cooperative agreement. Depending on the nature of the project and the costs involved, the project can be built under either a permit or cooperative agreement. Consult the *Caltrans Cooperative Agreement Manual* for the formats and procedures for preparing cooperative agreements.

Local assistance projects are either state administered or locally administered. Projects funded by others are either Caltrans administered, locally administered, or privately administered by a sponsor.

9-102 Caltrans Administered Local Assistance Projects

9-102 Caltrans Administered Local Assistance Projects

Caltrans administered local assistance projects should follow the *Construction Manual* (manual) and the current Caltrans *Standard Specifications* and *Standard Plans*. Whenever Caltrans advertises for bids, opens bids, and awards the contract, the project (including construction engineering) is considered "state administered." Normally, Caltrans personnel perform the construction engineering. However, arrangements may be made to staff the project with local agency personnel, or a combination of the two. In the latter case, the district (not the local agency) must ensure that such a project is properly staffed. Under no circumstances must the district allow such a project to be inadequately staffed simply because the local agency does not furnish the expected personnel.

Charges for Caltrans personnel on a "state administered" project are made against the expense authorization in the same manner as for all Caltrans projects. Using this charging method means that the local agency shares the engineering costs per the cooperative agreement. Charges for local agency personnel on "state administered" projects are also charged against the project and shared in accordance with the cooperative agreement between the local agency and Caltrans. The method of charging the project for local agency personnel may vary depending on the agency and the agreement.

Perform construction engineering for state administered local assistance projects in the same manner as for other state highway projects, except for the handling of contract change orders.

9-102A Contract Change Orders

The district local assistance engineer will determine eligibility for participation in federal or state financing and will ensure that the headquarters' and district's copies of all contract change orders are marked as "participating," "participating in part," or "nonparticipating." Consult with the local agency to ensure that it will accept its share of the costs. Subsequently, either headquarters or the district will approve the contract change orders in accordance with Section 5-3, "Contract Change Orders," of this manual. See Section 5-3 for a list of normally nonparticipating items.

For more information, see Chapter 16, Section 16.13, "Contract Change Orders," of the *Local Assistance Procedures Manual* (LAPM).

9-103 Locally Administered Local Assistance Projects

9-103 Locally Administered Local Assistance Projects

Whenever a local agency advertises for bids, opens bids, and awards the contract, the project (including construction engineering) is considered "locally administered." Local agency personnel perform the construction engineering unless arrangements are made (before the award) to staff the project with Caltrans personnel. When Caltrans personnel staff the project, charge the project for construction engineering costs (not including the costs for the district local assistance engineer) in accordance with the local agency-Caltrans agreement.

For the detailed procedures that local agencies must follow when administering these construction projects, see Chapter 15, "Advertise and Award Project," and Chapter 16, "Administer Construction Contracts," of the LAPM.

Construction engineering for locally administered local assistance projects must be performed in accordance with the LAPM.

For an overview of the role Caltrans staff can be requested to play in administering local assistance projects, consult the *Enhanced Services Program Plan* (available through the district local assistance engineer).

9-104 Projects Funded by Others

9-104 Projects Funded by Others

Handle as encroachment permits any projects on the state highway system funded by others costing $1,000,000 or less and classified as public utility projects.

Projects on the state highway system funded by others costing more than $1,000,000 are covered by a cooperative agreement with the local agency, or in the case of a private project sponsor, by a highway improvement agreement. These agreements will specify responsibility for advertising, award, administration, and construction engineering.

On contracts administered by local agencies or private sponsors, the project sponsor and the construction contractor must obtain encroachment permits before performing any work within the state highway right-of-way.

9-104A State Administered Projects Funded by Others

When a local authority uses sales tax revenues to fund a project requiring work on a state highway, Caltrans may advertise, award, and administer the construction contracts at the discretion of the district director. The authority must accept the processing procedures and scheduling normally applied to regular Caltrans highway projects because the measure projects will be processed along with regular State Transportation Improvement Program (STIP) projects.

When Caltrans administers a construction contract, use the Caltrans claims process in consultation with the fund provider. For more information about this process, refer to Section 5-4, "Disputes," of this manual.

The agreement must state that the fund provider will abide by the outcome of the Caltrans claims process.

9-104B Advertisement and Administration by Others

A local entity that advertises and awards contracts will also administer contract payments. Caltrans will review the advertisements and awards as outlined in the LAPM and the *Local Assistance Program Guidelines.*

9-104B (1) Construction Oversight

To ensure compliance with applicable state and federal regulations and Caltrans' standards and practices, Caltrans must oversee the contract administration of construction contracts administered by others. This oversight means Caltrans must provide policy and procedural direction to non-Caltrans organizations, personnel, or companies administering construction contracts on projects under encroachment permit on the state highway system. Caltrans must also provide such direction for similar organizations and personnel for projects that will become part of the state highway system in the future.

Caltrans oversight must also include the following:

- Reviews and written concurrence of change orders that modify the plans or specifications or impact public safety and convenience.
- Assistance in evaluating the local entity's or private sponsor's construction inspection capabilities, consultant selection, or both.
- Periodic on-site field reviews and consultations.
- Reviews of contract progress pay schedules prepared by the local entity's consultant without assuming responsibility for the accuracy of itemizations on progress pay schedules.

District construction must provide a Caltrans representative to be responsible for the oversight of work performed under the encroachment permit. The Caltrans representative must work through the local entity's or private sponsor's resident engineer. When the encroachment permit involves a structure, a representative from Caltrans Office of Structure Construction will oversee this work. Normally, the Caltrans representative will not be a permanent field site representative.

The Caltrans oversight of contract administration must also include independent assurance inspections and reviews and Caltrans representation in approving or disapproving workmanship and materials provided by the construction contractor. When public safety is jeopardized, the Caltrans representative will have the authority to stop the contractor's operation wholly or in part or take other appropriate action.

9-104B (2) Change Orders

For construction contracts not administered by Caltrans, Caltrans must still review and give written concurrence (or denial) of all change orders related to public safety, public convenience, and design or specification changes for work within the state's ultimate right-of-way. Review design changes with the original designer and the district's design oversight coordinator.

9-104B (3) Claims

Each construction contract will provide a claims process. When the local agency administers the contract, claims can be completed through the local agency's claim process. If the local agency does not have a claims process, one must be developed. As a model, the local agency can use the claims process outlined in Section 9-1.07B, "Final Payment and Claims," of the Caltrans *Standard Specifications*, but use local officials rather than Caltrans personnel. In any claims process, the Caltrans representative must be available to the local agency to provide advice and technical input.

The local entity must also provide for arbitration. As a guide, the local agency can use the arbitration process outlined in Section 9-1.10, "Arbitration," of the *Standard Specifications*.

9-104B (4) Bonding

On locally funded projects, local entities will not be required to provide a bond. If the local entity administers the construction contract, its contractor must provide two contract bonds in the local entity's name, with these bonds conforming to the requirements in Section 3-1.02, "Contract Bonds," of the *Standard Specifications*. Bonding is not required on toll road projects that are not on the state right-of-way.

If the private sponsor administers the construction contract, its contractor must provide two contract bonds conforming to the requirements in Section 3-1.02 of the *Standard Specifications*, naming only the state as obligee. If the private sponsor does not have a prime contractor for all the work in the Caltrans right-of-way, then each contractor working for the private sponsor in the state right-of-way must provide the bonds or the private sponsor may provide the bonds.

9-104B (5) Materials Inspection

Contracts administered by local agencies or private sponsors must provide for acceptance samples and tests as required in Chapter 6, "Sampling and Testing," of this manual. Acceptance testing will include full administration of sampling, testing, inspection, and acceptance of those materials and processes involved in the work described in Chapter 6 and elsewhere in this manual. Caltrans remains responsible for independent assurance tests, special tests, and source inspections.

The local entity or private sponsor must also do the following:

- Provide required documentation.
- For source inspection, follow the requirements of Section 6-2, "Acceptance of Manufactured Material and Sampling Methods." of this manual.
- Be responsible for primary contract acceptance sampling and testing.
- Before project acceptance, transmit to Caltrans all acceptance test records.

The district materials unit remains responsible for certain inspection and oversight activities, such as independent assurance tests and specialty tests. The Office of Materials Engineering and Testing Services will remain responsible for source inspection (off-site). Assurance tests, special tests, and source inspections must be considered as oversight. The Division of Construction will handle type approval of asphalt and concrete plants.

9-104B (6) Surveys

Construction surveys can either be addressed in the construction contract or performed separately by the local entity's staff or by a consultant hired by the local entity or private sponsor. These options are available regardless of which agency or private sponsor administers the construction contract.

Whichever agency does the engineering for the right-of-way maps must install the right-of-way monumentation and file the monumentation or record of survey maps with the county surveyors' office. Contract plans must include a "construction control" plan sheet, which must show Caltrans basic control points used to establish project control.

The district surveys unit must oversee field surveying. The district right of way unit must oversee the record of survey maps showing the new right-of-way lines.

9-104B (7) Insurance

Contractors working on projects with construction costs over $1,000,000, under an encroachment permit (except for public utilities), must have contractual liability insurance as outlined in Section 7-1.12, "Indemnification and Insurance," of the *Standard Specifications*. If the private sponsor does not have a prime contractor, then the private sponsor can provide the insurance policy. Before issuing the encroachment permit, the district must receive proof of the insurance policy. On locally funded and privately sponsored projects, the minimum policy limits must be those stated in Section 7-1.12.

Forms Used For Contract Administration Page No.

Division of Construction Forms

Form CEM-0101, Resident Engineer's Report of Assignment *A-1.1*
Form CEM-0501, Relief from Maintenance *A-1.2*
Form CEM-0601, Construction Safety Report *A-1.3*
Form CEM-0602, Project Safety Program Statement *A-1.4*
Form CEM-0603, Major Construction Incident Notification *A-1.5*
Form CEM-1201, Subcontracting Request *A-1.7*
Form CEM-2001, National Pollution Discharge Elimination System Annual Certification *A-1.9*
Form CEM-2002, Notification of Construction (NOC) *A-1.11*
Form CEM-2003, Notification of Completion of Construction (NCC) *A-1.15*
Form CEM-2101, COZEEP Daily Report *A-1.17*
Form CEM-2102, COZEEP/MAZEEP Task Order *A-1.19*
Form CEM-2401, Substitution Report for Disadvantaged Business Enterprise/Disabled Veteran Business Enterprise *A-1.21*
Form CEM-2402(F), Final Report- Utilization of Disadvantaged Business Enterprises (DBE), First - Tier Subcontractors (Federally Funded Projects) *A-1.23*
Form CEM-2402(S), Final Report - Utilization of Disabled Veteran Business Enterprises (DVBE) State Funded Projects *A-1.25*
Form CEM-2403(F), Disadvantaged Business Enterprises (DBE) Certification Status Change *A-1.27*
Form CEM-2404(F), Monthly DBE Trucking Verification *A-1.29*
Form CEM-2501, Fringe Benefit Statement *A-1.31*
Form CEM-2502, Contractor/Subcontractor Payroll *A-1.32*
Form CEM-2503, Statement of Compliance *A-1.33*
Form CEM-2504, Employee Interview: Labor Compliance/EEO *A-1.35*
Form CEM-2505, Owner - Operator Listing Statement of Compliance *A-1.37*
Form CEM-2506, Labor Compliance – Wage Violation *A-1.39*
Form CEM-2507, Labor Violation: Case Summary *A-1.41*
Form CEM-2508, Contractor's Payroll Source Document Review *A-1.43*
Form CEM-2509, Checklist – Source Document Review *A-1.45*
Form CEM-2601, Construction Progress Chart *A-1.47*
Form CEM-2701, Weekly Statement of Working Days *A-1.49*
Form CEM-2702, Overrun in Contract Time *A-1.51*
Form CEM-3101, Notice of Materials to be Used *A-1.53*
Form CEM-3501, AC Production/Placement Checklist *A-1.55*
Form CEM-3701, Test Result Summary *A-1.57*

Form CEM-3702, Relative Compaction Summary.....*A-1.58*
Form CEM-4101, Materials Release Summary.....*A-1.59*
Form CEM-4102, Material Inspected and Released on Job.....*A-1.60*
Form CEM-4202, Material Plant Safety Checklist *A-1.61*
Form CEM-4501, Resident Engineer's Daily Report/Assistant Resident Engineer's Daily Report.....*A-1.62*
Form CEM-4601, Assistant Resident Engineer's Daily Report.....*A-1.63*
Form CEM-4701, Drainage System Summary *A-1.65*
Form CEM-4801, Quantity Calculations.....*A-1.67*
Form CEM-4900, Contract Change Order.....*A-1.68*
Form CEM-4901, Contract Change Order Input *A-1.71*
Form CEM-4902, Extra Work Bill (Short Form).....*A-1.73*
Form CEM 4902A, Extra Work Bill - Title Page.....*A-1.75*
Form CEM-4902B, Extra Work Bill - Labor Charges.....*A-1.77*
Form CEM-4902C, Extra Work Bill - Equipment Charges.....*A-1.79*
Form CEM-4902D, Extra Work Bill - Material Charges.....*A-1.81*
Form CEM-4903, Contract Change Order Memorandum.....*A-1.83*
Form CEM-5101, Request for Payment for Materials on Hand.....*A-1.85*
Form CEM-6001, Project Record - Estimate Request.....*A-1.86*
Form CEM-6002, Contract Administration System (CAS) –Report Requests.....*A-1.87*
Form CEM-6003, Progress Pay - Estimate Project Initiation or Update.....*A-1.88*
Form CEM-6004, Contract Transactions Input *A-1.89*
Form CEM-6201, Notice of Potential Claim.....*A-1.91*
Form CEM-6301, Contract Acceptance.....*A-1.93*
Form CEM-9001 Construction Manual Proposed Change.....*A-1.95*

Office of Materials Engineering and Testing Services Forms

Form TL-0101, Sample Identification Card *A-1.96*
Form TL-0502, Field Sample of Portland Cement Concrete Sample Card *A-1.97*
Form MR-0518, Job Cement Samples Record.....*A-1.98*

Other State Forms

Form LA-16, Product, Material, or Method Report (For Highway Planting or Erosion Control) *A-1.99*
Form LA-17, Report of Chemical Spray Operations *A-1.100*
Form TR-0019, Notice of Change in Clearance or Bridge Weight Rating.....*A-1.101*
Form TR-0020, Notice of Change in Vertical or Horizontal Clearance *A-1.102*
Form TR-0029, Notice of Change in Clearance or Bridge Weight Rating.....*A-1.103*

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

RESIDENT ENGINEER'S REPORT OF ASSIGNMENT

CEM-0101 (REV 6/1999)

Forward all information available at time of assignment; use supplementary sheet to report additional information.

PERSONAL INFORMATION NOTICE

Pursuant to the Federal Privacy Act (P.L. 93-579) and the Information Practices Act of 1977 (Civil Code Sections 1798, et seq.), notice is hereby given for the request of personal information by this form. The requested personal information is voluntary. The principle purpose of the voluntary information is to facilitate the processing of this form. The failure to provide all or any part of the requested information may delay processing of this form. No disclosure of personal information will be made unless permissible under Article 6, Section 1798.24 of the IPA of 1977. Each individual has the right upon request and proper identification, to inspect all personal

CO./RTE/PM	CONTRACT NUMBER	JOB STAMP
PROJECT LIMITS		
TYPE OF WORK		
RESIDENT ENGINEER NAME	FIELD OFFICE LOCATION	
FIELD OFFICE MAILING ADDRESS		FIELD OFFICE PHONE NO.
HOME ADDRESS		HOME PHONE NO.
CONTRACTOR NAME		
CONTRACTOR'S FIELD OFFICE MAILING ADDRESS		FIELD OFFICE PHONE NO.
CONTRACTOR'S SUPERINTENDENT NAME		DATE CONTRACTOR BEGAN WORK

In case of emergency conditions (after regular work hours) on the above construction project, any of the following persons should be contacted.

CALIFORNIA DEPARTMENT OF TRANSPORTATION

NAME	BUSINESS ADDRESS & PHONE NO. NORMAL WORK HOURS	HOME ADDRESS & PHONE NO. WEEKENDS & HOLIDAYS

CONTRACTOR

NAME	BUSINESS ADDRESS & PHONE NO. NORMAL WORK HOURS	HOME ADDRESS & PHONE NO. WEEKENDS & HOLIDAYS

COMMENTS:

RESIDENT ENGINEER'S SIGNATURE	**DATE**

DISTRIBUTION: *(If Applicable)*

- ☐ District Director of Transportation
- ☐ District Communications Center
- ☐ Maintenance Superintendent
- ☐ District Laboratory
- ☐ Materials & Research
- ☐ Resident Engineer File
- ☐ Contractor
- ☐ H.Q. Construction
- ☐ CCO Room
- ☐ Highway Patrol
- ☐ County Sheriff
- ☐ City Police
- ☐ U.S. Forest Service
- ☐ Dept. of Parks & Rec.
- ☐ Other:

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

RELIEF FROM MAINTENANCE

CEM-0501 (Rev. 6/97)

CONTRACT NUMBER	COUNTY, ROUTE, BRIDGE OR POST MILES, OR POST KILOMETERS	FEDERAL NO.

CONTRACTOR NAME AND BUSINESS ADDRESS

DESCRIPTION

BY LETTER(S) DATED _____ , THE CONTRACTOR HAS REQUESTED RELIEF FROM MAINTAINING THE FOLLOWING COMPLETED PORTIONS OF THE PROJECT:

RELIEF FROM MAINTENANCE AND RESPONSIBILITY AS INDICATED ABOVE IS RECOMMENDED.

_____
Signature, Resident Engineer

RELIEF FROM MAINTENANCE AND RESPONSIBILITY GRANTED IN ACCORDANCE WITH THE ABOVE RECOMMENDATION

_____
Signature, District Director, Dist.

_____
Date

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CEM0501

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONSTRUCTION SAFETY REPORT

CEM-0601 (REV 04/2001)

FIELD OFFICE OR JOB STAMP

1. TYPE OF REPORT

☐ PROJECT SAFETY REVIEW ☐ *PUBLIC SAFETY* ☐ *CT EMPLOYEE SAFETY* | ☐ CONTRACT ADMINISTRATION | ☐ TAILGATE SAFETY MEETING

NAME	TITLE	DATE
NAME	TITLE	DATE
NAME	TITLE	DATE

2. DISCUSSION *(List Inspection Findings or Safety Topics Discussed)*

3. ACTIONS TAKEN *(List Corrective Actions or Recommendations)*

4. SUPERVISOR'S COMMENTS *(List comments, instructions, etc.)*

5. SIGNATURES OF EMPLOYEES PRESENT *(Use attached sheet for additional signatures)*

SIGNATURE	SIGNATURE	SIGNATURE
SIGNATURE	SIGNATURE	SIGNATURE
SIGNATURE	SIGNATURE	SIGNATURE
SIGNATURE OF 1st LINE SUPERVISOR		DATE
SIGNATURE OF 2nd LINE SUPERVISOR		DATE
SIGNATURE OF SAFETY OFFICER		DATE

FM 91 1298 ORIGINAL - DISTRICT OFFICE CC - FILE CC - BULLETIN BOARD

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT SAFETY PROGRAM STATEMENT

CEM-0602 (REV 04/2001)

FIELD OFFICE OR JOB STAMP

1. CODE OF SAFE PRACTICES *(Mark the sections of the C.O.S.P. which apply to this project)*

☐ GENERAL SAFETY	☐ TRAFFIC CONTROL SYSTEMS	☐ OTHER SPECIAL CONSIDERATIONS
☐ EQUIPMENT	☐ EXCAVATIONS	☐ ELECTRICAL
☐ ELEVATED WORK AREAS	☐ NIGHT WORK	☐ FIELD TESTING
☐ HAZARDOUS MATERIALS	☐ FACILITIES	☐ CONFINED / ENCLOSED SPACE
☐ VEHICLE OPERATIONS	☐ PROJECT SPECIFIC REQUIREMENTS	☐ MATERIAL PLANT SITES

2. PLANNED, PERIODIC INSPECTIONS (*Planned, periodic safety inspections will be conducted as follows)*

STAGE	INTERVAL	STAGE	INTERVAL
	WORK DAYS		WORK DAYS
	WORK DAYS		WORK DAYS

3. PROJECT SAFETY COORDINATOR IS:

4. PROGRAM AGREEMENT

RESIDENT ENGINEER'S SIGNATURE	DATE
CONSTRUCTION ENGINEER'S SIGNATURE	DATE
CONSTRUCTION SAFETY COORDINATOR'S SIGNATURE	DATE

5. EMPLOYEE'S ACKNOWLEDGMENT - *(Each employee shall acknowledge reading the C.O.S.P. by their signature)*

I HAVE READ THE APPLICABLE CODE OF SAFE PRACTICES

SIGNATURE	DATE	SIGNATURE	DATE

FM 91 1329

USE AN ATTACHED SHEET FOR ADDITIONAL SIGNATURES

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

MAJOR CONSTRUCTION INCIDENT NOTIFICATION

CEM-0603 (NEW 3/2001)

URGENT - DELIVER IMMEDIATELY

FAX this form (no cover sheet) IMMEDIATELY to:

- **Headquarters Office of Safety and Health @ 916-227-2639, CALNET 8-498-2639**
- **Construction Program Manager/Safety Coordinator @ (916) 654-6345, CALNET 8-464-6345** _____

Follow district procedure for notifying personnel within your area. Completion of this form does not relieve the federal and Cal/OSHA reporting requirements. See the construction and safety manuals for more information on reporting requirements.

Report

Report Date ____/____/_____ Report Time ___ :___ ☐AM ☐ PM

☐Initial Report ☐Updated Report ☐Final Report

Person Preparing Report _____ Phone # (___) - ____ - _____

Incident Site Information

Incident Date ____/____ /_____ Incident Time ___ :___ ☐AM ☐PM

Location: District/Co./Rte/Kilo or Mile Post Direction: ☐NB ☐SB ☐EB ☐WB

_____/ _____/ ___/ _____ Weather _____

Resident Engineer_____ Phone # _____

Prime Contractor_____ E.A. # _____

Is incident within a construction zone? ☐Yes ☐No

Describe nature of work: _____

_____

CHP Officer: I.D. # _____ CHP Report # _____

	STATE	CONSULTANT	CONTRACTOR	PUBLIC
FATAL				
SERIOUS				

Name of Hospital:_____

Description (facts only-use additional sheet if necessary)

_____

_____

_____

_____

_____

_____

MAJOR CONSTRUCTION INCIDENT NOTIFICATION

URGENT - DELIVER IMMEDIATELY

ADA Notice For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 263-2041 or TDD (916) 263-2044 or write Records and Forms Management, 1120 N Street, Sacramento, CA 95814.

INSTRUCTIONS

Use this *fax report form* to report any fatal or serious accident or any accident with the potential to be fatal or disabling. The "Person Preparing Report" is to FAX the information to the Headquarters Office of Safety and Health, the Construction Program, and the district construction safety coordinator. Fax an Initial Report immediately, even if information is minimal. The *Initial Report* is intended to notify management as-soon-as possible. An *Updated Report* may be used to provide supplementary information when deemed necessary. Follow district procedure for notifying personnel within the district.

INCIDENTS TO BE REPORTED USING THIS FAX REPORT FORM (no cover sheet)

- Incidents involving death or serious injury to a state or a consultant employee or resulting in the death of a contractor's employee. Telephone in notice of the incident, in advance of the fax when possible:
  1. Phone HQ - Office of Safety & Health @ 916-227-2640
  2. Phone HQ - Construction Program Manager/Safety Coordinator@ 916-654-2157/916-654-5627
  3. Phone District Construction Management/Safety Coordinator @_____
- Incidents resulting in serious injury to a contractor's employee
- Incidents involving serious damage to equipment owned by the state, consultants or the contractor.
- Incidents resulting in the serious injury or death of a member of the public within the construction zone, or influenced in any manner by construction-related activities, conditions, equipment or personnel.
- All catastrophic type of incidents or incidents receiving wide media coverage.
- Incidents which may result in a significant delay to the traveling public.
- Incidents with no injuries, but with a high potential for being fatal or disabling include, but are not limited to: false-work or guying system failures, overturned cranes, high-voltage contacts, trench excavation or shoring failures, gas or fuel line fire or explosions, hazardous utilities breaks, and collisions with structures under construction or their supporting false-work that cause displacement of a major member.

A SERIOUS INJURY IS ANY INJURY MEETING ONE OF THE FOLLOWING CRITERIA:

- The injured person misses three days or more of work (submit report if deemed possible).
- Two or more employees miss more than one day of work (submit report if deemed possible).
- Any injury resulting in hospital admission other than for medical observation. If the medical condition of the victim is unknown, but the victim was transported by ambulance then the injury should be considered as serious until more information becomes available.

REQUIRED CONTENT OF FAX REPORT FORM

- Contact information about person preparing report (name, and phone number).
- Contract identification (contract number, any federal project number, county, route, and kilo-post limits, resident engineer, and the prime contractor).
- Basic incident information (date, time, specific location, and prevailing weather conditions). This should be in sufficient detail to enable the Construction Program to obtain the California Highway Patrol's or local police report if necessary.
- Names of the persons involved in the incident and their affiliation with the contract (contractor, consultant, state employee, or private citizen).
- Description of the incident and how it occurred **(facts only)**.
- Identification of other agencies making an investigation, and the names, badge numbers and report numbers when this information is available.

The resident engineer should take sufficient photographs or videotapes to document the conditions that existed at the time of the incident, including all signing and traffic control features that may have been in effect at the time of the accident. Depending on district policy and the nature and severity of the accident, additional documentation may be required. The construction safety coordinator should be consulted for additional information in such cases.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

SUBCONTRACTING REQUEST

CEM-1201 (REV. 4/99) CT# 7541-3514-7

Front

See Instructions On Back

REQUEST NUMBER

CONTRACTOR NAME	COUNTY	ROUTE
BUSINESS ADDRESS	CONTRACT NO.	
CITY/STATE / ZIP CODE	FEDERAL AID PROJECT NO. *(From Special Provisions)*	

SUBCONTRACTOR *(Name, Business Address, Phone)*	BID ITEM NUMBER(S)	% OF BID ITEM SUBBED	CHECK IF: (See Categories Below) (1)	(2)	(3)	DESCRIBE WORK WHEN LESS THAN 100% OF WORK IS SUBBED	$ AMOUNT BASED ON BID $ AMOUNT

Categories: 1) Speciality 2) Listed Under Fair Practices Act 3) Certified DBE/DVBE

I Certify That:

- The Standard Provisions for labor set forth in the contract apply to the subcontracted work.
- If applicable, *(Federal Aid Projects only)* Section 14 *(Federal Requirements)* of the Special Provisions have been inserted in the subcontracts and will be incorporated in any lower-tier subcontract. Written contracts have been executed for the above noted subcontracted work.

CONTRACTOR'S SIGNATURE	DATE

NOTE: This section is to be completed by the Resident Engineer

1.	Total of bid items		$
2.	Speciality items (previously requested)	$	
3.	Specialty items (this request)	$	
4.	Total (lines 2+3)	$	
5.	Contractor must perform with own forces (lines 1 minus 4)	% $	$
x		$	
6.	Bid items previously subcontracted	$	
7.	Bid items subcontracted (this request)	$	
8.	Total (lines 6+7)	$	$
9.	Balance of work Contractor to perform (lines 1 minus 8)		

APPROVED

RESIDENT ENGINEER'S SIGNATURE	DATE

COPY DISTRIBUTION: **Original** - Contractor **Green** - Resident Engineer **Canary** - Dist. Const Office/Labor Compliance Officer **Pink** - HQ Construction Program **Goldenrod** - Contractor's Information Copy

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Back

INSTRUCTIONS FOR COMPLETING SUBCONTRACTING REQUEST FORM

All First-tier subcontractors must be included on a subcontracting request.

Submit in accordance with Sections 8-1.01 of the Standard Specifications. Type or print requested information. Information copy (goldenrod) is to be retained by the contractor. Submit other copies to the project's Resident Engineer. After approval, the original will be returned to the contractor.

When an entire item is subcontracted, the value to be shown is the contractor's bid price.

When a portion of an item is subcontracted, describe the portion, and show the % of bid item and value.

THIS FORM IS NOT TO BE USED FOR SUBSTITUTIONS.

Prior submittal of a CP-CEM-1201 involving a replacement Subcontractor, submit a separate written request for approval to substitute a listed subcontractor. Section 4107 of the Government Code covers the conditions for substitution.

Submit a separate written request for approval of any DBE/DVBE substitution. Include appropriate backup information and state what efforts were made to accomplish the same dollar value of work by other certified DBE/DVBEs.

NOTE: For contractors who will be performing work on railroad property, it is necessary for the contractor to complete and submit the Certificate of Insurance (State Form DH-OS-A10A) naming the subcontractor as insured. ***No work will be allowed which involves encroachment on railroad property until the specified insurance has been approved.***

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM ANNUAL CERTIFICATION

CEM-2001 (NEW 9/95)

RESIDENT ENGINEER NAME		CALTRANS CONTRACT NO.
PROPOSED STARTING DATE	PROPOSED COMPLETION DATE	COUNTRY, ROUTE, POST MILES
WORK DESCRIPTION		

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

CONTRACTOR SIGNATURE	DATE

THIS CERTIFICATION COMPLIES WITH THE REQUIREMENTS OF THE STATEWIDE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM PERMIT NO. CAS000002, ORDER NO. 92-08-DWQ FOR CONSTRUCTION.

APPROVAL

RESIDENT ENGINEER'S SIGNATURE	DATE

Note to Resident Engineer:
If you cannot certify compliance, notify the appropriate Regional Water Board. Identify the type of non-compliance and the action necessary to achieve compliance. Include a time schedule for achieving compliance. This notification must be made within 30 days.

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

NOTIFICATION OF CONSTRUCTION

CEM-2002 (NEW 4/10/2000)

IN COMPLIANCE WITH CALTRANS STATEWIDE NPDES STORM WATER PERMIT Order No. 99-06 DWQ, NPDES No. CAS000003

I. IDENTIFICATION - Attach Vicinity Map, ½ size copy of Title Sheet

PROJECT	CHECK ONE: ☐ First Submittal or Amendment No.	CONTRACT NUMBER EA	DATE MM/DD/YYYY

CITY (if applicable)	COUNTY	TENTATIVE START DATE	TENTATIVE END DATE

ROUTE	POST MILE	KILOMETER POST	TENTATIVE DATE SWPPP AVAILABLE

II. CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

☐ Region1, North Coast	Region 5, Central Valley	Region 6, Lahontan	☐ Region 7, Colorado River
☐ Region 2, San Francisco Bay	☐ Sacramento	☐ South Lake Tahoe	☐ Region 8, Santa Ana
☐ Region 3, Central Coast	☐ Fresno	☐ Victorville	☐ Region 9, San Diego
☐ Region 4, Los Angeles	☐ Redding		

III. CALTRANS DISTRICT

NAME/NUMBER	PROJECT CONTACT
ADDRESS	POSITION TITLE
CITY	PHONE

IV. CONSTRUCTION FIELD OFFICE - Attach Location Map

STREET ADDRESS			CONSTRUCTION CONTACT
PHYSICAL LOCATION IF DIFFERENT THAN ADDRESS ABOVE			POSITION TITLE
CITY	STATE	ZIP	PHONE

V. CONSTRUCTION SITE INFORMATION

DESCRIPTION AND TYPE OF WORK

ADDITIONAL RELATED REQUIRED APPROVALS: ☐ DTSC Variance ☐ CWA 404/401 ☐ DFG 1601 ☐ NPDES/WDRs ☐ OTHER

DESCRIBE:

TOTAL CONSTRUCTION AREA: ACRES HECTARES	TOTAL DISTURBED AREA: ACRES HECTARES
RECEIVING WATER NAME:	PROJECT IN OR ADJACENT TO RECEIVING WATER? ☐ YES

PROJECT DISCHARGES TO? ☐ GROUNDWATER INFILTRATION	BASIN LOCATION:	MUNICIPAL/OTHER SYSTEM NAME:

VI. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or to those persons directly responsible for gathering the information, the information submitted is true, accurate and belief. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment of knowing violations.

SIGNATURE	DATE
PRINT/TYPE NAME	TITLE

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION
NOTIFICATION OF CONSTRUCTION (NOC) INSTRUCTIONS
CEM-2002 (NEW 4/10/2000)

CALTRANS STATEWIDE NPDES PERMIT
Order No. 99-06 DWQ, NPDES CAS000003

The Permit requires that a Notification of Construction (NOC) for construction projects covered by the Permit be submitted to the appropriate Regional Water Quality Control Board (RWQCB) at least 30 days prior to the start of construction. In some cases, the RWQCB may view two or more smaller projects in the same corridor as part of a larger common plan of development. The Project Manager should be aware of other projects in the corridor. If needed, these projects should be mentioned in section V. Construction Site Information.

Typically, most of the information on the form is completed by the District Storm Water Coordinator, Environmental staff, Project Manager or Project Engineer. That individual also submits the NOC to the appropriate RWQCB(s) at the same time the PS&E package is transmitted to the Office Engineer. No fees are to be to submitted to the RWQCBs. A copy should also be transmitted to the District Construction Division.

At the time of the first submittal to the RWQCB, the District may elect to leave blank the information in Section IV. Construction Field Office and resubmit a copy of the form with that information filled in at the time the Resident Engineer (RE) is assigned. Alternately, the District may wish to fill in a contact name of someone other than the RE, such as the Area Senior Construction Engineer or Project Manager, who will remain the contact for that project until the NOC is resubmitted with the new contact information, or until the Notice of Completion of Construction (NCC) is filed.

The form may be filled in electronically or by printing legibly.

I. IDENTIFICATION. Provide a brief project descriptive name, a "nickname." When the NOC is first submitted to the RWQCB, check the First Submittal box. For subsequent changes of information, including contact information, enter the amendment number.

Enter the Contract Number. Use the construction phase EA.

Enter the date that the NOC is first submitted to the Regional Water Quality Control Board (RWQCB), or date of subsequent submittals.

Provide a "to scale" or "to approximate scale" drawing of the construction site and the immediate surrounding area. Limit the map to an 8.5" x 11" or 11" x 17" size. At a minimum, the map must show the site perimeter, the geographic features surrounding the site, general topography, and location of the construction project in relation to surface waters and named streets, roads, intersections, or landmarks. Do not submit a drawing unless it meets the above size limits.

Enter the city, if applicable, or N/A if not within city limits. Enter the county or counties, route number, post mile and kilometer post. Also enter the tentative start and end dates.

Enter a tentative date the Storm Water Pollution Prevention Plan (SWPPP) will be available.

CALTRANS STATEWIDE NPDES PERMIT
Order No. 99-06 DWQ, NPDES CAS000003

II. CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD(S).
Check the box of the RWQCB(s) that has jurisdiction over the area that the project is in.

III. CALTRANS DISTRICT. Enter the name and address of the Caltrans District individual responsible for submittal of the NOC to the RWQCB. Typically that individual is the Project Engineer, Project Manager, the District Storm Water Coordinator, or Environmental Program staff.

IV. CONSTRUCTION FIELD OFFICE. Enter Caltrans field office information, if known, and Construction Contact person information. As discussed above, the District may elect to use the contact information for the RE after the project has been assigned, or another individual, such as the Area Senior or Project Manager. If the Construction Contact information changes, then the District should resubmit a revised form to the RWQCB(s). Provide the physical address of the field office, or a description of the physical location of the field office if no physical address is available and a location map.

V. CONSTRUCTION SITE INFORMATION. Provide a brief narrative description of the work. You can attach a checklist of permanent and/or temporary BMPs if needed, or required by a RWQCB. A checklist of construction BMPs can also be attached later as an amendment after the SWPPP is completed.

Check the box or boxes to indicate any additional required approvals, permits or certifications. Some examples are: variance from the Department of Toxics Substances Control (DTSC) for reuse of soil containing lead, dredge or fill operations requiring Army Corps of Engineers 404 certification and/or Clean Water Act 401 certification, streambed alteration requiring Department of Fish and Game 1601 permit and non-storm water discharges requiring separate waste discharge requirements. Describe the condition and whether the approval, permit or certification has been issued. If the project involves soils subject to the DTSC variance, notify the appropriate RWQCB(s) to determine if separate waste discharge requirements must be issued. The RWQCBs have up to 120 days to issue waste discharge requirements, so the RWQCBs should be notified early in the process.

Indicate the total size in acres and hectares, of the construction project. Also indicate the size of the disturbed soil area. Disturbed soil area is defined in the Storm Water Management Plan as "areas of exposed, erodible soil, including stockpiles, that are within the construction limits and that result from construction activities."

Identify the name of the surface receiving water body for the storm water discharge. Indicate whether the project is in or immediately adjacent to the receiving water. If the storm water is infiltrated, check the box for infiltration basin, and identify the basin's location. If the discharge is to a separate storm sewer system, such as a collection system operated by a municipality, flood control district, utility, or similar entity, check the box for municipal/other system and the name of the system owner.

VI. CERTIFICATIONS. The permit requires that all reports and information requested by the SWRCB or RWQCBs be signed by an Executive Officer, Executive Director or a duly authorized representative if the authorization is made in writing. If signature authority is delegated to staff, a copy of that delegation letter should be sent to the Storm Water Manager at Headquarters.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

NOTICE OF COMPLETION OF CONSTRUCTION

CEM-2003 (NEW 4/12/2000)

IN COMPLIANCE WITH CALTRANS STATEWIDE NPDES STORM WATER PERMIT Order No. 99-06 DWQ, NPDES No. CAS000003

I. IDENTIFICATION

PROJECT	CONTRACT NUMBER EA	DATE MM/DD/YYYY

CITY (if applicable)	COUNTY	ROUTE	KILOMETER POST / POST MILE (S)	START DATE	END DATE

II. CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

- ☐ Region1, North Coast
- ☐ Region 2, San Francisco Bay
- ☐ Region 3, Central Coast
- ☐ Region 4, Los Angeles

Region 5, Central Valley
- ☐ Sacramento
- ☐ Fresno
- ☐ Redding

Region 6, Lahontan
- ☐ South Lake Tahoe
- ☐ Victorville

- ☐ Region 7, Colorado River
- ☐ Region 8, Santa Ana
- ☐ Region 9, San Diego

III. CALTRANS DISTRICT

NAME/NUMBER		PROJECT CONTACT
ADDRESS		POSITION TITLE
CITY	ZIP	PHONE

IV. BASIS OF COMPLETION

☐ 1. The construction job is complete and requirements met as of ***Date:*** _____

☐ 2. Construction activities have been suspended, as of ***Date:*** _____ ***Expected Start Up Date:*** _____

☐ 3. Site can not discharge storm water to waters of the United States ***Reason:*** _____

☐ 4. Discharge is now subject to NPDES Permit ***No.*** _____ ***Date:*** _____

V. DESCRIPTION OF COMPLETION (Attach site photographs)

VI. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or to those persons directly responsible for gathering the information, the information submitted is true, accurate, and complete to the best of my knowledge and belief. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment of knowing violations.

SIGNATURE

PRINT/TYPE NAME

DATE

TITLE

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CALTRANS STATEWIDE NPDES PERMIT
Order No. 99-06 DWQ, NPDES CAS000003

I. IDENTIFICATION. The project name, contract number, city, county, route, kilometer post and post mile information should be identical to that on the Notification of Construction form. Enter the date the Completion of Construction (NCC) is submitted to the Regional Water Quality Control Boards (RWQCB) and the start and end dates of construction.

II. CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS. Check the box next to the appropriate RWQCB(s).

III. CALTRANS DISTRICT. Provide the Caltrans District information and the name, title and phone of the construction contact, which by District policy may be the Resident Engineer (RE), the Area Senior, the Program Manager, National Pollution Discharge Elimination System (NPDES) Coordinator or other responsible staff. The contact should be someone who can address RWQCB staff questions about project storm water controls or who can refer a RWQCB staff to a someone who can.

IV. BASIS OF COMPLETION. Check one of the boxes:

1. The construction project has been completed and
- all elements of the Storm Water Pollution Prevention Plan (SWPPP) have been completed;
- construction materials and equipment maintenance waste have been disposed of properly;
- final stabilization requirements have been met, i.e., when all soil disturbing activities are completed and either:
  - a. a uniform vegetative cover with 70 percent coverage has been established or
  - b. equivalent stabilization measures have been employed. (i.e., erosion resistant soil coverings or treatments). Caltrans projects typically include erosion control on all disturbed areas, which is considered to be equivalent stabilization.
- the post-construction storm water operation and management plan is in place.

2. Construction activities have been suspended, either temporarily or indefinitely and
- all elements of the SWPPP have been completed;
- construction materials and equipment maintenance waste have been disposed of properly;
- all denuded areas and other areas of potential erosion are stabilized;
- an operation and maintenance plan for erosion and sediment control is in place;
- the date construction activities were suspended, and the expected start up date

3. The construction site can not discharge storm water to waters of the United States. Indicate how prevention of all discharge is ensured, and if all storm water is retained on site or collected offsite.

4. The discharge of construction storm water from the site is now subject to another NPDES general permit or an individual NPDES permit. The general permit or individual permit NPDES number and the date coverage began should be provided.

V. DESCRIPTION OF COMPLETION
Briefly describe how the completion requirements have been met. Attach site photographs.

VI. CERTIFICATION
The permit requires information submitted be signed by the District Director or a duly authorized representative. If the District Director elects to delegate signature authority, the District must first have submitted the list of authorized representatives to the appropriate RWQCB.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

COZEEP DAILY REPORT

CEM-2101 (REV 04/2001) CT# 7541-3201-3

(JOB STAMP)

DATE

DAILY REPORT NUMBER * DISTRICT ___ ___ EA ___ ___ ___ ___ 4

SPECIAL DESIGNATION - **COZEEP**

Object Code: **042**

PROJECT LOCATION/DESCRIPTION

COUNTY	ROUTE	POST MILE

DESCRIPTION OF WORK

OFFICER/SERGEANT/VEHICLE INFORMATION

CHP DIVISION/AREA CODE _____

CHP SPECIAL PROJECT CODE _____

CHP

(Please Print)	1	2	3	4
MEMBER NAME				
ID NUMBER				
RANK				
VEHICLE NUMBER				
STARTING TIME				
ENDING TIME**				
TOTAL TIME				
STARTING MILEAGE				
ENDING MILEAGE**				
TOTAL MILEAGE**				
INITIALS *(end of shift)*				

CALTRANS APPROVAL

NAME AND TITLE *(print)*	SUPERVISOR'S NAME (*print*)	COST CENTER

APPROVAL SIGNATURE *(End of Shift)*	PHONE	FIELD OFFICE

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* Use District/Cost Center as the Daily Report Number.

** These figures are estimates and may be increased or decreased in accordance with the terms of the contract.

WHITE - District COZEEP Coordinator BLUE - CHP Officer PINK - Resident Engineer (Project Files)

COZEEP/MAZEEP TASK ORDER

CEM-2102 (New 10/1999)

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COZEEP/MAZEEP TASK ORDER

District/EA: /
Date of Request _____
Project Number _____ (optional)

This task order is entered into pursuant to the provisions of the Interagency Agreement No._____ between Caltrans and the California Highway Patrol (CHP).
This task order implements and is hereby made part of Interagency Agreement No_____.

1. Project Description and Location (include the county route and post kilometer)

2. Type of Services Required

3. Date(s) and time(s) services are to be provided

Reporting Date _____	Reporting Date _____	Reporting Date _____
Reporting Time_____	Reporting Time _____	Reporting Time _____
*Completion Time_____	*Completion Time_____	*Completion Time_____
Reporting Date _____	Reporting Date _____	Reporting Date _____
Reporting Time _____	Reporting Time _____	Reporting Time _____
*Completion Time_____	*Completion Time_____	*Completion Time_____

* Estimated

4. Project Officials

Caltrans Project Supervisor

Name _____
Title _____
Telephone No._____
Facsimile No._____

CHP Coordinator (completed by CHP)

Name _____
Title _____
Telephone No._____
Facsimile No._____

5. Reporting

Caltrans and CHP agree that all reporting for this job shall be accomplished through the standard COZEEP/MAZEEP Daily Report Form. Revisions, other versions, or additional forms shall not be used.

Approvals

Caltrans

By _____
(Name and Title)

California Highway Patrol

By _____
(Name, ID # and Title)

6. Cancellations

FIRST CANCELLATION			
Cancellation Notice Issued By (name of Caltrans Employee)		Signature:	
Date and Time Notification issued			
Member Name	Member ID	$50	4 Hours
Person Receiving Notification (Print Name/ID#):		Signature	
Date and Time Notification Received			

SECOND CANCELLATION			
Cancellation Notice Issued By (name of Caltrans Employee)		Signature:	
Date and Time Notification issued			
Member Name	Member ID	$50	4 Hours
Person Receiving Notification (Print Name/ID#):		Signature	
Date and Time Notification Received			

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

SUBSTITUTION REPORT FOR DISADVANTAGED BUSINESS ENTERPRISE/DISABLED VETERAN BUSINESS ENTERPRISE

CEM-2401 (REV. 3/99) CT# 7541-3507-3

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(See Reverse for Instructions)

CONTRACT NUMBER

REQUEST DATE

PRIME CONTRACTOR

☐ STATE FUNDED PROJECT

☐ FEDERAL AID PROJECT

APPROVAL

RESIDENT ENGINNEER (Signiture) DATE

GOOD FAITH EFFORT

DEPUTY DISTRICT DIRECTOR - CONSTRUCTION (Signature) DATE

LISTED OR PREVIOUSLY APPROVED SUBCONTRACTOR ☐ DBE ☐ DVBE

PROPOSED SUBCONTRACTOR ☐ DBE ☐ DVBE

ITEM #	WORK DESCRIPTION	DOLLAR AMOUNT COMPLETED	REMAINING DOLLAR AMOUNT	ITEM #	WORK DESCRIPTION	DOLLAR AMOUNT
	TOTAL $				TOTAL $	

REASONS FOR SUBSTITUTION

(Check Appropriate Block)

☐ 1. The listed DBE/DVBE, after having a reasonable opportunity to do so, failed, or refused to execute a written contract, when such written contract, based upon the general terms, conditions, plans and specifications for the project, or on the terms of such subcontractor's or supplier's written bid, was presented by the Contractor.

☐ 2. The listed DBE/DVBE is bankrupt or insolvent.

☐ 3. The listed DBE/DVBE failed or refused to perform the contract or furnish the listed materials.

☐ 4. The listed DBE/DVBE subcontractor failed or refused to meet the bond requirements of the Contractor.

☐ 5. The work performed by the listed subcontractor was substantially unsatisfactory and was not in substantial accordance with the plans and specifications, or the subcontractor was substantially delaying or disrupting the progress of work.

☐ 6. It was in the best interest of the State.

REMARKS:

DISTRIBUTION: **ORIGINAL - Contractor** **GREEN - Resident Engineer** **CANARY - Disrict Construction/Labor Compliance Officer** **PINK - Construction Program** **GOLDENROD - Business Enterprise Program**

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

SUBSTITUTION REPORT FOR DISADVANTAGED BUSINESS ENTERPRISE/DISABLED VETERAN BUSINESS ENTERPRISE

CEM-2401 (REV. 3/99) CT# 7541-3507-3

INSTRUCTIONS

Contract Number	Example: 01-234567
State Funded/Federal Aid	Check one only.
Approval	Resident Engineer can approve if: One DB is to be substituted for another DB if the same items of work are involved or, if different items, the dollar value is equal to or greater than the original proposal; the new DB is certified.
Good Faith Effort	DDD or his/her designee must approve if: A good faith effort was made to substitute listed subcontractor, but proposed subcontractor is not certified as DBE.
Date	Date of approval by Resident Engineer/Deputy District Director.
Listed/Proposed Subcontractor	Indicate name of subcontractors involved. Check one box only, as applicable.
Item Number	From Special Provisions.
Work Description	Corresponds to Item #, Special Provisions. List only items or partial items of work allocated to subcontractor being removed.
Dollar	Dollar amount of work completed by previously approved contractor, and dollar amount of remaining work. (If a portion of the work has been done, explain in the remarks section or on attachment.)
Reasons for Substitution	Check appropriate box.

FM 2180 M 94 95 86073

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

FINAL REPORT - UTILIZATION OF DISADVANTAGED BUSINESS ENTERPRISES (DBE), FIRST-TIER SUBCONTRACTORS

CEM-2402F (REV. 10/1999) CT# 7541-3502-2

CONTRACT NUMBER	COUNTY	ROUTE	☐ POST MILES ☐ POST KILOMETERS	☐ FEDERAL AID PROJECT	ADMINISTERING AGENCY	CONTRACT COMPLETION DATE

PRIME CONTRACTOR	BUSINESS ADDRESS	ESTIMATED CONTRACT AMOUNT
		$

ITEM NO.	DESCRIPTION OF WORK PERFORMED AND MATERIALS PROVIDED	SUBCONTRACTOR NAME AND BUSINESS ADDRESS	DBE CERT. NUMBER	CONTRACT PAYMENTS					DATE WORK COMPLETE	DATE OF FINAL PAYMENT
				NON-DBE	DBE	DBE MINORITY	DBE (NON-MINORITY WOMEN)	DBE (MINORITY WOMEN)		
			TOTALS	$	$	$	$	$		

ORIGINAL COMMITMENT

$ DBE

$ DBE MINORITY

$ DBE (Non-MINORITY WOMEN)

$ DBE (MINORITY WOMEN)

List all First Tier Subcontractors, Disadvantaged Business Enterprises (DBE's) regardless of tier, whether or not the firms were originally listed for goal credit. If actual DBE utilization (or item of work) was different than that approved at time of award, provide comments on back of form. List actual amount paid to each DBE, even if different than originally listed for goal credit.

I CERTIFY THAT THE ABOVE INFORMATION IS COMPLETE AND CORRECT

CONTRACTOR REPRESENTATIVE'S SIGNATURE	BUSINESS PHONE NUMBER	DATE

TO THE BEST OF MY INFORMATION AND BELIEF, THE ABOVE INFORMATION IS COMPLETE AND CORRECT

RESIDENT ENGINEER'S SIGNATURE	BUSINESS PHONE NUMBER	DATE

COPY DISTRIBUTION: **Original** - Construction Program **Green** - Business Enterprise Program **Canary** - Contractor **Pink** - District Construction **Golden Rod** - Resident Engineer

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

FINAL REPORT - UTILIZATION OF DISADVANTAGED BUSINESS ENTERPRISES (DBE), FIRST-TIER SUBCONTRACTORS

CEM-2402F (REV. 10/1999) CT# 7541-3502-2

The form requires specific information regarding the construction project: Contract Number, County, Route, Post Miles/ Post Kilometers, a box to check that the project is indeed a Federal Aid Project, the Administering Agency (Caltrans), the Contract Completion Date and the Estimated Contract Amount. It requires the prime contractor name and business address. The focus of the form is to describe who did what by contract item numbers and descriptions, asking for specific dollar values of item work completed broken down by subcontractors who performed the work, both DBE and non-DBE work forces. DBE prime contractor's are required to show the date of work performed by their own forces along with the corresponding dollar value of work.

The form has a column to enter the Contract Item No. (or Item No's) and description of work performed or materials provided, as well as a column for the subcontractor name and business address. For those firms who are DBE, there is a column to enter their DBE Certification Number. The DBE should provide their certification number to the contractor and notify the contractor in writing with the date of the decertification if their status should change during the course of the project.

The form has five columns for the dollar value to be entered for the item work performed by the subcontractor.

The Non-DBE column is used to enter the dollar value of work performed for firms who are not certified DBE.

The decision of which column to be used for entering the DBE dollar value is based on what program(s) the firm is certified. This Program status is determined by the Civil Rights Certification Unit based on ethnicity, gender, ownership and control issues at time of certification. The certified firm is issued a certificate by the Civil Rights Unit that states their program status as well as the firms expiration date. DBE Program status may be obtained by accessing the civil rights website (http://www.dot.ca.gov/hq/bep/) and downloading the Calcert Extract or by calling (916) 227-2207. Based on this DBE Program status, the following table depicts which column to be used:

DBE Program Status	Column to be used
If program status shows DBE only with no other programs listed.	DBE
If program status shows DBE, SMBE	DBE Minority
If program status shows DBE, SMBE, SWBE	DBE (Minority Women)
If program status shows DBE, SWBE	DBE (Non-Minority Women)

If a contractor performing work as a DBE on the project becomes decertified and still performs work after their decertification date, enter the total value performed by this contractor on Form 2402(F) under the appropriate DBE Program Status (include all work performed after decertification) and complete and submit Form CEM-2403 (F) as appropriate. Any comments to be made on the Form CEM-2403(F) is being submitted.

If a contractor performing work as a Non-DBE on the project becomes certified as a DBE enter the dollar value of all work performed as a DBE on CEM-2402(F) and CEM-2403(F). Any comments to be made on the form 2402(F) are to be explained on the reverse side of the form. Indicate in the Comments section that Form CEM-2403(F) is being submitted.

There is a space provided on the CEM-2402(F) where TOTAL is entered for these five columns.

There is a column on the CEM-2402(F) to enter the Date Work Complete as well as a column to enter the Date of Final Payment, which is an indicator of when the prime contractor made the "final payment" to the subcontractor for the portion of work listed as being completed.

The Original Commitment area on the CEM_2402(F) is based in information at award time of the project and is the dollar value of those subcontractors listed as being at award based on the above table.

The CEM-2402(F) has an area at the bottom where the contractor and the resident engineer sign and date that the information provided is complete and correct.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

FINAL REPORT - UTILIZATION OF DISABLED VETERAN BUSINESS ENTERPRISES (DVBE) STATE FUNDED PROJECTS

CEM-2402S (REV. 10/1999) CT# 7541-3502-2

CONTRACT NUMBER	COUNTY	ROUTE	☐ POST MILES ☐ POST KILOMETERS	☐ STATE FUNDED	ADMINISTERING AGENCY	CONTRACT COMPLETION DATE

PRIME CONTRACTOR	BUSINESS ADDRESS	ESTIMATED CONTRACT AMOUNT
		$

CONTRACT ITEM NO.	DESCRIPTION OF WORK PERFORMED AND MATERIALS PROVIDED	SUBCONTRACTOR NAME AND BUSINESS ADDRESS	DBE CERT NO	CONTRACT PAYMENTS			
				DVBE (STATE-FUNDED PROJECTS ONLY)	DATE WORK COMPLETED	DATE OF FINAL PAYMENT	COMMENTS
ORIGINAL COMMITMENT DVBE $			TOTALS	$			

List all Disabled Veterans Business Enterprises (DVBE's) regardless of tier, whether or not the firms were originally listed for goal credit. If actual DVBE utilization (or item of work) was different than that approved at time of award, provide comments. List actual amount paid to each DVBE, even if different than originally listed for goal credit.

I CERTIFY THAT THE ABOVE INFORMATION IS COMPLETE AND CORRECT

CONTRACTOR REPRESENTATIVE'S SIGNATURE	BUSINESS PHONE NUMBER	DATE

TO THE BEST OF MY INFORMATION AND BELIEF, THE ABOVE INFORMATION IS COMPLETE AND CORRECT

RESIDENT ENGINEER'S SIGNATURE	BUSINESS PHONE NUMBER	DATE

COPY DISTRIBUTION: **Original** - Construction Program **Green** - Business Enterprise Program **Canary** - Contractor **Pink** - District Construction **Golden Rod** - Resident Engineer

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

FINAL REPORT - UTILIZATION OF DISABLED VETERAN BUSINESS ENTERPRISES (DVBE) STATE FUNDED PROJECTS

CEM-2402S (REV. 10/1999) CT# 7541-3502-2

The form requires specific information regarding the construction project: Contract Number, County, Route, Post Miles/ Post Kilometers, a box to check that the project is indeed a State-Funded Project, the Administering Agency (Caltrans), the Contract Completion Date and the Estimated Contract Amount. It requires the prime contractor name and business address. The focus of the form is to describe by contract item numbers, descriptions of the work performed, and specific dollar values of the actual item work completed by the certified DVBE contractor(s).

The form has a column to enter the Contract Item No. (or Item No's) and description of work performed or materials provided, as well as a column for the subcontractor name and business address. There is a column to enter the DVBE Certification Number. The DVBE should provide their certification number to the contractor.

The form has a column DVBE (State-Funded Projects Only) for the dollar value to be entered for the item(s) work performed by the DVBE subcontractor as well as a column to enter the Date Work Completed. In the column Date of Final Payment, this is where the prime contractor enters the date for the "final payment" to the subcontractor for work completed.

The box addressed as "TOTAL" is where the total dollar value of the column DVBE (State Funded Projects Only) is entered.

The Original Commitment area on the CEM-2402(S) is based in information at award time of the project and is the dollar value of the DVBE subcontractors listed at award.

There is a comments section for any additional information that may need to be provided regarding any of the above transactions.

The CEM-2402(S) has an area at the bottom where the contractor and the resident engineer sign and date that the information provided is complete and correct.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

DISADVANTAGED BUSINESS ENTERPRISES (DBE) CERTIFICATION STATUS CHANGE

CEM-2403(F) (NEW 10/1999)

CONTRACT NUMBER	COUNTY	ROUTE	☐ POST MILES ☐ POST KILOMETERS	ADMINISTERING AGENCY	CONTRACT COMPLETION DATE
PRIME CONTRACTOR			BUSINESS ADDRESS		ESTIMATED CONTRACT AMOUNT $

The Contractor: List all DBE's with change in certification status (certified/decertified) while in your employ, whether or not firms were originally listed for goal credit. Attach DBE certification/decertification letter in accordance with the Special Provisions.

CONTRACT ITEM NO.	SUBCONTRACTOR NAME AND BUSINESS ADDRESS	BUSINESS PHONE	CERTIFICATION NUMBER	AMOUNT PAID WHILE CERTIFIED	CERTIFICATION/ DECERTIFICATION DATE Letter attached ☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐

COMMENTS:

I CERTIFY THAT THE ABOVE INFORMATION IS COMPLETE AND CORRECT			
CONTRACTOR REPRESENTATIVE'S SIGNATURE	TITLE	BUSINESS PHONE NUMBER	DATE
TO THE BEST OF MY INFORMATION AND BELIEF, THE ABOVE INFORMATION IS COMPLETE AND CORRECT			
RESIDENT ENGINEER'S SIGNATURE		BUSINESS PHONE NUMBER	DATE

COPY DISTRIBUTION: **Original** - Construction Program **Green** - Business Enterprise Program **Canary** - Contractor **Pink** - District Construction **Golden Rod** - Resident Engineer

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

DISADVANTAGED BUSINESS ENTERPRISES (DBE) CERTIFICATION STATUS CHANGE

CEM-2403(F) (NEW 10/1999)

The top of the form requires specific information regarding the construction project: Contract Number, County, Route, Post Miles/ Post Kilometers, the Administering Agency (Caltrans), the Contract Completion Date and the Estimated Contract Amount. It requires the prime contractor name and business address. The focus of the form is to substantiate and verify the actual DBE dollar amount paid to contractors on federally funded projects that had a change in certification status during the course of the completion of the contract. The two situations that are being address by CEM 2403(F) are if a firm certified as a DBE and doing construction work on the contract during the course of the project becomes decertified, and if a non-DBE firm doing work on the contract during the course of the project becomes certified as a DBE.

The form has a column to enter the Contract Item No. (or Item No's), as well as a column for the Subcontractor name and Business Address, Business Phone and contractor's Certification Number.

The column entitled Amount Paid While Certified will be used to enter the actual dollar value of the work performed by those contractors who meet the conditions as outlined above during the time period they are certified as a DBE. This column on the CEM-2403(F) should only reflect the dollar value of work performed while the firm was certified as a DBE.

The column called Certification/Decertification Date (Letter attached) will reflect either the date of the Decertification Letter sent out by the Civil Rights or the date of the Certification Certificate mailed out by the Civil Rights. There is a box to check that support documentation is attached to the CEM-2403(F) form.

There is a comments section for any additional information that may need to be provided regarding any of the above transactions.

The CEM-2403(F) has an area at the bottom where the contractor and the resident engineer sign and date that the information provided is complete and correct.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

MONTHLY DBE TRUCKING VERIFICATION

CEM-2404(F) (NEW 12/1999)

CONTRACT NO.			MONTH				YEAR
Truck Owner	DBE Cert. No.	Company Name and Address	Truck No.	California Hwy. Patrol CA No.	Commission Or Amount Paid*	Date Paid	Lease Arrangement (✓ if applicable)
					$		☐ Lease Agreement ☐ Non-DBE ☐ DBE
					$		☐ Lease Agreement ☐ Non-DBE ☐ DBE
					$		☐ Lease Agreement ☐ Non-DBE ☐ DBE
					$		☐ Lease Agreement ☐ Non-DBE ☐ DBE
					$		☐ Lease Agreement ☐ Non-DBE ☐ DBE
					$		☐ Lease Agreement ☐ Non-DBE ☐ DBE
					$		☐ Lease Agreement ☐ Non-DBE ☐ DBE
					$		☐ Lease Agreement ☐ Non-DBE ☐ DBE
					$		☐ Lease Agreement ☐ Non-DBE ☐ DBE
				TOTAL AMOUNT PAID	$		
PRIME CONTRACTOR			BUSINESS ADDRESS				BUSINESS PHONE NUMBER

* Upon request all Lease Agreements shall be made available, in accordance with the Special Provisions.

I CERTIFY THAT THE ABOVE INFORMATION IS COMPLETE AND CORRECT

CONTRACTOR REPRESENTATIVE'S SIGNATURE	TITLE	DATE

CEM-2404F (NEW 12/1999) COPY DISTRIBUTION: ORIGINAL - RESIDENT ENGINEER

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MONTHLY DBE TRUCKING VERIFICATION

CEM-2404(F) (NEW 12/1999)

The top of Form CEM-2404(F) contains boxes to put in the Contract Number, the Month of the reporting period and the Year of the reporting period.

The Form CEM-2404(F) has a column to enter the name of the Truck Owner, the DBE Cert. No. (if DBE certified) and the Name and Address of the trucking company. The Form CEM-2404(F) also requires the Truck No. and the California Highway Patrol CA No.

Form CEM-2404(F) is to be submitted prior to the 15th of each month and must show the dollar amount paid to the DBE trucking company(s) for truck work performed by DBE certified trucks and for any fees or commissions of nonDBE trucks utilized each month on the project. The amount paid to each trucking company is to be entered in the column called "Commission or Amount Paid", in accordance with the Special Provisions Section 5-1.X.

Payment information is derived using the following:

1.) 100% for the trucking services provided by the DBE using trucks it owns, operates and insures.
2.) 100% for the trucking services provided by trucks leased from other DBE firms.
3.) The fee or commission paid on non-DBEs for the lease of trucks. The prime does not receive 100% credit for these services because they are not provided by a DBE company.

The total dollar figure of this column is to be placed in the box labeled "Total Amount Paid".
The column "Date Paid" requires a date that each trucking company is paid for services rendered. The next column contains information that must be completed if a lease arrangement is applicable. Located at the bottom of Form is a space to put the name of the "Prime Contractor", their "Business Address" and their "Business Phone No.".

At the bottom of Form there is a space for the Contractor or designee "Contractor Representative's Signature, Title and Date" certifying that the information provided on the form is complete and correct.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

FRINGE BENEFIT STATEMENT

CEM-2501 (REV. 8/1994)

CONTRACTOR/SUBCONTRACTOR (Please Print)	CONTRACT NUMBER	FEDERAL AID PROJECT NUMBER	DATE

TO: RESIDENT ENGINEER/DISTRICT LABOR COMPLIANCE OFFICER	BUSINESS ADDRESS

The following information (as shown or referenced on wage rate determinations) paid to or on behalf of employees in various crafts or classifications is used to check payrolls or applied to force account work on the above contract.

THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE FIRST CERTIFIED PAYROLL, OR WHEN THERE HAVE BEEN ANY CHANGES.

CLASSIFICATION	FRINGE BENEFIT HOURLY AMOUNT	NAME AND ADDRESS OF PLAN, FUND, OR PROGRAM
Effective Date _____	Vacation $ _____	
_____	Health & Welfare $ _____	_____
	Pension $ _____	_____
Subsistence and/or Travel Pay:	Apprentice /Training $ _____	_____
$ _____	Other $ _____	_____

CLASSIFICATION	FRINGE BENEFIT HOURLY AMOUNT	NAME AND ADDRESS OF PLAN, FUND, OR PROGRAM
Effective Date _____	Vacation $ _____	
_____	Health & Welfare $ _____	_____
	Pension $ _____	_____
Subsistence and/or Travel Pay:	Apprentice /Training $ _____	_____
$ _____	Other $ _____	_____

CLASSIFICATION	FRINGE BENEFIT HOURLY AMOUNT	NAME AND ADDRESS OF PLAN, FUND, OR PROGRAM
Effective Date _____	Vacation $ _____	
_____	Health & Welfare $ _____	_____
	Pension $ _____	_____
Subsistence and/or Travel Pay:	Apprentice /Training $ _____	_____
$ _____	Other $ _____	_____

I certify under penalty of perjury that fringe benefits are paid to the approved Plans, Funds, or Programs as listed above.

NAME AND TITLE (Please Print)	
SIGNATURE	BUSINESS TELEPHONE NUMBER

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CEM2501

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

☐ **CONTRACTOR PAYROLL** ☐ **SUBCONTRACTOR PAYROLL**

CEM-2502 (REV 4/2001)

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PERSONAL INFORMATION NOTICE

Pursuant to the Federal Privacy Act (P.L. 93-579) and the Information Practices Act of 1977 (Civil Code Sections 1798, et seq.), notice is hereby given for the request of personal information by this form. The requested personal information is voluntary. The principle purpose of the voluntary information is so the department can fulfill the need of the form. The failure to provide all or any part of the requested information may delay processing of this form. No disclosure of personal information will be made unless permissible under Article 6, Section 1798.24 of the IPA of 1977. Each individual has the right upon request and proper identification, to inspect all personal information in any record maintained on the individual by an identifying particular. Direct any inquiries on information maintenance to your IPA Officer.

CONTRACTOR/SUBCONTRACTOR

BUSINESS ADDRESS

PAYROLL NO. | FOR WEEK ENDING | PROJECT AND LOCATION | CONTRACT NUMBER | FEDERAL AID NUMBER

EMPLOYEE NAME, ADDRESS AND SOCIAL SECURITY NUMBER	NUMBER OF WITH-HOLDING EXEMPTIONS	WORK CLASSIFICATION	OT OR ST	DAY AND DATE / HOURS WORKED EACH DAY							TOTAL HRS.	RATE OF PAY	GROSS AMOUNT EARNED		DEDUCTIONS (BASED ON GROSS AMOUNT EARNED - ALL PROJECTS)							NET WAGES PAID FOR	CK. NO.
													THIS PROJECT	ALL PROJECTS	FED TAX	FICA (SOCIAL SECURITY)	STATE TAX	SDI	VAC	OTHER	TOTAL DEDUCT-TIONS		
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CEM-2502 (REV 4/2001)

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

STATEMENT OF COMPLIANCE

CEM-2503 (REV 8/96)

CONTRACTOR/SUBCONTRACTOR	CONTRACT NUMBER
FIRST DAY AND DATE OF PAY PERIOD	LAST DAY AND DATE OF PAY PERIOD

I do hereby certify under penalty of perjury:

(1) That I pay or supervise payment to employees of the above-referenced contractor on the above-referenced contract. All persons employed on said project for the above-referenced time period have been paid their full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said contractor from the full weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person other than permissible deductions.

(2) That any payrolls otherwise under this control required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less that the applicable wages rates:

(a) ☐ Specified in the applicable wage determination incorporated into the contract;

(b) ☐ Determined by the Director of Industrial Relations for the county or counties in which the work is performed;

that the classification set forth therein for each laborer or mechanic conform with the work he or she performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency.

(4) That fringe benefits as listed in the contract:

(a) ☐ Have been or will be paid to the approved plan(s), fund(s), or program(s) for the benefit of listed employee(s), except as noted below.

(b) ☐ Have been paid directly to the listed employee(s), except as noted below.

(c) ☐ See exceptions noted below.

EXCEPTION CRAFT	EXPLANATION

REMARKS:

NAME (PLEASE PRINT.)	TITLE
SIGNATURE	DATE

On federally-funded projects, permissible deductions are defined in Regulation, Part 3 (29 CFR, Subtitle A), issued by the Secretary of Labor under the Copland Act, as amended (48 Sat. 948 63 Stat. 108,72 State. 967;76 Stat 357:40 U. S. C. 276c).

Also, the willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution (See Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code).

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CEM2503

STATEMENT OF COMPLIANCE

CEM-2503 (REV 8/96) INSTRUCTIONS

This statement of compliance meets needs of the state and federal payroll requirements to pay fringe benefits in addition to payment of the minimum rates. The contractor's obligation to pay fringe benefits may be met by payment of the fringes to the various preapproved plans, funds, or programs or by making these payments directly to the employees as part of their weekly wage payments.

The contractor must **show on the face of his or her payroll all monies paid to the employees** whether as basic rates or total hourly wage amount in lieu of fringes. The contractor shall report in the statement of compliance that **he or she is paying to others** fringes required by the contract and not paid directly to the employees in lieu of fringes.

Detailed instructions follow:

Contractors required to pay Federal Wage Rates:

Such a contractor shall check paragraph 2(a) of the statement to indicate that the wage rates for laborers or mechanics contained in the payroll are not less than the applicable wage rates specified in the applicable wage determination incorporated into the contract.

Contractors required to pay the State Prevailing Wage Rates as determined by the Director of Industrial Relations:

Such a contractor shall check paragraph 2(b) of the statement to indicate that the wage rates for laborers or mechanics contained in the payroll are not less than the applicable wage rates determined by the Director of Industrial Relations for the county or counties in which the work is preformed.

Contractor who pay all required fringe benefits:

A contractor who pays fringe benefits to approved plans, funds, or programs in amounts not less than were determined in the applicable wage decisions shall continue to show on the face of his or her payroll the basic hourly rate and overtime rate paid to his or her employees, just as he or she has always done. Such a contractor shall check paragraph 4(a) of the statement to indicate that he or she is also paying approved plans, funds, or programs within the times required for the receipt of those sums, not less than the amount predetermined as fringe benefits for each craft. Any exception shall be noted in Section 4(c).

Contractors who pay no fringe benefits:

A contractor who does not pay fringe benefits to an approved plan shall pay a like amount to the employee. This payment can be reported by inserting in the straight time hourly rate column of his or her payroll an amount not less than the predetermined rate for each classification plus the amount of fringe benefits determined for each classification in the applicable wage decision. Inasmuch as it is not necessary to pay time and a half on wages paid in lieu of fringes, the overtime rate shall be not less than one and one-half the basic predetermined rate, plus the required cash in lieu of fringes at the straight time rate. To simplify computation of overtime, it is suggested that the straight time basic rate and payment in lieu of fringes be separately stated in the hourly rate column, thus $14.56/5.11. In addition, the contractor shall check paragraph 4(b) of the statement to indicate that he or she is paying fringe benefits directly to his or her employees. Any exceptions shall be noted in Section 4(c).

Use of Section 4(c), Exceptions:

Any contractor who is making payment to approved plans, funds, or programs in amounts less than the wage determination required is obligated to pay the deficiency directly to the employees as wages in lieu of fringes. Any exceptions to Section 4(a) and 4(b), whichever the contractor may check, shall be entered in Section 4(c). Enter in the Exception column the craft, and enter in the Explanation column the hourly amount paid the employees as wages in lieu of fringes, and the hourly amount paid to plans, funds, or programs as fringes.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

EMPLOYEE INTERVIEW: LABOR COMPLIANCE / EEO

CEM 2504 (REV 6/1999) (Front) CT #7541-3512-3

ADA Notice

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CONFIDENTIAL

This document contains personal information and pursuant to Civil Code 1798.21 it shall be kept confidential in order to protect against unauthorized disclosure.

INSTRUCTIONS - (SEE REVERSE SIDE)

CONTRACT NO

FED. NO.

1. TO BE FILLED IN BY INTERVIEWER ***(Data may be obtained from payroll records or during source document review)***

EMPLOYEE NAME		LABOR CLASSIFICATION
MINIMUM BASE WAGE PER CONTRACT:	BASE RATE	FRINGE BENEFITS
MINIMUM BASE WAGE PER PAYROLL (If available):	BASE RATE	FRINGE BENEFITS
EMPLOYER		PRIME CONTRACTOR ON THE PROJECT *(IF SAME, SO STATE)*

WORK BEING PERFORMED AT TIME OF INTERVIEW

2. QUESTIONS TO BE ASKED OF EMPLOYEE

A. HOW LONG HAVE YOU WORKED FOR YOUR PRESENT EMPLOYER? | HOW LONG ON THIS PROJECT?

B. DESCRIBE THE TYPE OF WORK YOU HAVE BEEN DOING THIS PAST WEEK

C. WHAT IS YOUR WAGE *[Include Base Rate and Fringe Benefits (Compare to Payroll)]* | DO YOU KEEP A RECORD OF THE HOURS YOU WORK? ☐ YES ☐ NO

D. DO YOU WORK OVERTIME? ☐ FREQUENTLY ☐ SELDOM ☐ NONE | ARE YOU PAID TIME AND ONE-HALF FOR OVERTIME? ☐ YES ☐ NO | IF NO, EXPLAIN

E. HAS YOUR EMPLOYER DIRECTED YOUR ATTENTION TO THE REQUIRED WAGE RATE POSTERS ON THE PROJECT? ☐ YES ☐ NO | HAVE YOU SEEN THOSE POSTERS? ☐ YES ☐ NO | IF NO, EXPLAIN

F. ARE YOU AWARE OF THE CONTRACTOR'S EEO POLICIES? ☐ YES ☐ NO | DOES THE CONTRACTOR HOLD REGULAR EEO MEETINGS? ☐ YES ☐ NO | HOW OFTEN?

WHO CONDUCTS THE MEETINGS? | WHO IS THE EEO OFFICER FOR YOUR EMPLOYER? | WHO IS THE EEO OFFICER FOR THE PROJECT?

G. ARE YOU INTERESTED IN / OR HAS YOUR EMPLOYER INFORMED YOU OF UPGRADING AND TRAINING POSSIBILITIES? ☐ YES ☐ NO | IF YES, PLEASE EXPLAIN

3. ADDITIONAL QUESTIONS FOR OWNER OPERATORS

A. EQUIPMENT DESCRIPTION | TRUCK LICENCE NO. | TRUCK (CAL-T) NO.

HOURLY RATE *(Fully operated and maintained)* $ | BASE EQUIPMENT RATE $ | ON WHAT DO YOU BASE YOUR EQUIPMENT RENTAL RATE? ☐ HOURLY ☐ WEEKLY ☐ MONTHLY

B. DO YOU OWN THE EQUIPMENT? ☐ YES ☐ NO | MAY I SEE YOUR CERTIFICATE OF OWNERSHIP? *(Interviewer Note Response)* ☐ YES ☐ NO

LEGAL OWNER | REGISTERED OWNER

4. EMPLOYEE COMMENTS

DO YOU HAVE ANY COMMENTS OR COMPLAINTS ABOUT WAGES OR EEO POLICIES? BE SPECIFIC:

5. INTERVIEWER'S COMMENTS

INTERVIEWER'S SIGNATURE	DATE	RESIDENT ENGINEER'S SIGNATURE	DATE

FM 91 1282

91 61116

EMPLOYEE INTERVIEW: LABOR COMPLIANCE / EEO

CEM 2504 (REV 6/1999) (Back) CT #7541-3512-3

DIRECTIONS TO INTERVIEWER

1. ***Fill in Section 1 from payroll records, if available, after interview.***
2. ***Fill in Section 2 completely. (does not apply to owner operators)***
3. ***Fill in Section 3 completely.***
4. ***Employee comments optional in Section 4.***
5. ***Interviewer comments on findings and recommends further actions to be taken. Attach additional sheets if necessary.***

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

OWNER-OPERATOR LISTING

CEM-2505 (REV 05/2001)

NAME OF CONTRACTOR EMPLOYING OWNER OPERATOR(S)	ADDRESS

PAYROLL NO	FOR WEEK ENDING	PROJECT AND LOCATION	CONTRACT NO

NAME, ADDRESS, SOCIAL SECURITY NO. AND CONTRACTORS LICENSE NO. OF OWNER-OPERATOR (IF ANY)	WORK CLASSIFICATION	DESCRIPTION OF EQUIPMENT	TRUCK CAL T NO. AND/OR EQUIP. LICENSE NO.	OT OR ST	DAY AND DATE							TOTAL WEEKLY HOURS	HOURLY RATE OF PAY	GROSS PAYMENT EARNED	CHECK NO.
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NOTE: CERTIFICATION WILL BE ACCEPTED ONLY FROM THE CONTRACTOR EMPLOYING THE OWNER OPERATOR: IT WILL NOT BE ACCEPTED FROM THE OWNER OPERATOR HIM / HERSELF.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

OWNER-OPERATOR LISTING STATEMENT OF COMPLIANCE

CEM-2505 (REV 05/2001)

Date _____

_____ _____ do hereby state:
(Name of signatory party) (Title)

(1) That I pay or supervise the payment of the persons reported on this form as Owner-operators by _____
(Contractor or subcontractor)

on the _____, that during the payroll period commencing on the _____day of _____
(Building or work)

_____ and ending _____ day of _____ _____, all persons working on said project have been paid the full weekly sums earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full weekly sums earned by any person and that no deductions
(Contractor or subcontractor)

have been made either directly or indirectly from the full sums earned by any person, other than permissible deductions, as described below:

_____

_____

_____

(2) That any payrolls or listings or otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll or listings payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in Section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ Each Laborer or mechanic listed in the above referenced payroll or listings has been paid as indicated on the payroll or listings an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in Section 4(c) below:

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

Remarks:

NAME AND TITLE	SIGNATURE

On federally-funded projects, permissible deductions are defined in regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. 276c).

Also, the willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution (see Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code).

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

LABOR COMPLIANCE - WAGE VIOLATION

CEM-2506 (REV. 4/1981)

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CONTRACTOR INVOLVED

EMPLOYEE	SOCIAL SECURITY NUMBER	NAME OF CONTACT
LOCATION OF DOCUMENTS		PHONE NUMBER OF CONTACT
LAST KNOWN ADDRESS	CONTRACT NUMBER	FEDERAL NUMBER

DATE	CLASSIFICATION (Payroll)	CLASSIFICATION (Actual)	HOURS WORKED	HOURLY RATE REQUIRED		HOURLY RATE PAID		DAILY TOTAL REQUIRED PAY		DAILY TOTAL ACTUAL PAY		DAILY TOTAL WAGES DUE		LABOR PENALTIES STATE		FEDERAL
				ST	OT	ST	OT	ST	OT	ST	OT	ST	OT	ST	OT	OT

COMMENTS

CALCULATED BY

CHECKED BY

RESTITUTION

DATE	AMOUNT	BAL. DUE	CHECK #

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

LABOR VIOLATION: CASE SUMMARY

CEM-2507 (REV. 11/88)

(TO BE USED WITH FORM CEM-2506)

ADA Notice

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CONTRACTOR INFORMATION

CONTRACTOR INVOLVED

ADDRESS

PRIME CONTRACTOR ☐ SAME

ADDRESS

CONTRACTOR INFORMATION

CONTRACT NUMBER	FEDERAL NUMBER(S)
CONTRACT ADVERTISEMENT DATE	AWARD DATE
COMPLETION OR ESTIMATED COMPLETION DATE	ACCEPTANCE DATE
COUNTY WHERE WORK WAS PERFORMED	RESIDENT ENGINEER

WAGES AND PENALTIES

TOTAL WAGES UNDERPAID (STRAIGHT TIME)	$	TOTAL STATE PENALTIES (STRAIGHT TIME) x $25	$
TOTAL UNDERPAYMENTS OF TRAVEL and/or SUBSISTENCE	$	TOTAL STATE PENALTIES (FAILURE TO SUBMIT PAYROLL RECORDS, PER L.C. 1776(F) NO. OF EMPLOYEES x DAYS x $25.00/DAY	$
TOTAL WAGES UNDERPAID (OVERTIME)	$		
TOTAL RESTITUTION TO DATE	$	TOTAL STATE PENALTIES (OVERTIME) x $25	$
TOTAL WAGES STILL DUE (STRAIGHT TIME, TRAVEL/SUBSISTENCE & OVERTIME)	$	TOTAL FEDERAL PENALTIES (OVERTIME) x $10	$
NUMBER OF UNDERPAID WORKERS		CASE TOTAL	$
WAGE RESTITUTION VERIFIED BY: (NAME OF PERSON)		DISTRICT DEDUCTION FOR THIS CASE	$
HOW VERIFIED: ☐ CANCELLED CHECKS ☐ INTERVIEW(S) OR		APPLICABLE STATE GENERAL PREVAILING WAGE RATE BOOK	MONTH / YEAR
		FEDERAL WAGE DETERMINATION NUMBER(S)	MONTH DAY YEAR

INVESTIGATION BACKGROUND

(FOR THIS SECTION, USE ADDITIONAL SHEET IF NECESSARY - SHOW ITEM NUMBER)

1. BRIEF, CONCISE STATEMENT OF THE NATURE OF THE CIRCUMSTANCES PROMPTING THE INVESTIGATION

2. BRIEF DESCRIPTION OF THE NATURE AND EXTENT OF THE INVESTIGATION

3. BRIEF, CONCISE STATEMENT OF THE FACTS RELATING TO THE DISCREPANCIES

CHRONOLOGY

DATE	DISTRICT ACTION	DATE	HEADQUARTERS ACTION
	Case began (problem discovered)		Concurrence Letter
	Letter of contractor requesting review		Request to Director for authority to withhold
	confirmation of review - letter/telephone		Letter to prime regarding withhold and rights of appeal
	Case to Headquarters		

DISTRICT INVESTIGATOR	DISTRICT LABOR COMPLIANCE OFFICER - SIGNATURE	DATE

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

LABOR VIOLATION: CASE SUMMARY

CEM-2507 (REV. 11/88)
(TO BE USED WITH FORM CEM-2506)

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONTRACTOR'S PAYROLL SOURCE DOCUMENT REVIEW

CEM-2508 (REV. 10/1998)

CONTRACTOR REVIEWED

CONTRACT NUMBER	FEDERAL NUMBER	DATE REVIEWED

CONTRACTOR'S ADDRESS

LOCATION OF DOCUMENTS *(IF DIFFERENT FROM CONTRACTOR'S ADDRESS)*

NAME/TELEPHONE NUMBER OF CONTACT AT LOCATION OF DOCUMENTS

PRIME CONTRACTOR

☐ SAME

ADDRESS:

REASON FOR REVIEW:

DEFICIENCIES

☐ NO ☐ YES *(BRIEFLY IDENTIFY BELOW)*

DISTRICT ACTION, RECOMMENDATION & CONCLUSIONS

☐ DEFICIENCIES CORRECTED ☐ CASE PREPARED

DISTRICT REVIEWER	DATE	SIGNATURE OF DISTRICT LC OFFICER	DATE

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CHECKLIST - SOURCE DOCUMENT REVIEW

CEM-2509 (Rev. 11/1998) (USE WITH FORM CEM-2508)

CONTRACTOR REVIEWED	CONTRACT NUMBER
COMPLETION DATE	R.E.

N/A = NOT APPLICATABLE S/R = SEE REMARKS PR = PAYROLLS

ITEM	ITEM	YES	NO	N/A	S/R
A	GENERAL				
A1	Prime notified				
A2	Sub notified				
A3	Sub approved				
A4					
B	PAYROLLS				
B1	Same as submitted				
B2	Time Cards/PR agree				
B3	Canceled Checks/PR agree				
B4	Wages pd at/above contract min.				
B5	Nonworking supv. shown on PR				
B6	Fed/State tax held from employee wages				
B7	Employee interview on file (No.)				
B8	Employee interview reflect problem				
B9					
C	PROPRIETORSHIP				
C1	Sole proprietor				
C2	Partnership				
C3	Partnership papers available				
C4	Partnership profit papers available				
C5	Corporation				
C6	Are corp. officers laborers/ mechanics				
C7	If so, recieving proper wages				
C8					
D	BENEFITS				
D1	Fringes paid cash				
D2	Fringes paid to a trust fund				
D3	Trust fund approved				
D4	Trust statements available				
D5	Statement hrs per employee per month equal or exceed total PR hours				
D6	Canceled checks agree with payments				
D7	Canceled checks agree with statements				
D8					
D9					

ITEM	ITEM	YES	NO	N/A	S/R
E	MISCELLANEOUS				
E1	Business license: Co./City # Yr.				
E2	Subcontract contain Section 6				
E3	Home office bulletin board in order				
E4					
E5					
F	INVESTIGATION				
F1	Number of payrolls reviewed: All Random				
F2	Number of wage underpayments				
F3	Number of workers underpaid:				
F4					
G	CONCLUSIONS				
G1	Payrolls okay				
G2	Discepancies intentional				
G3					
G4					
H	DISTRICT RECOMMENDATIONS				
H1	Assess State penalties				
H2	Assess Federal penalties				
H3	Contractor aware of findings				
H4	Case to Hqs				
H5					
H6					

ENTER ITEM #	REMARKS

DISTRICT REVIEWER	DATE	DISTRICT LC OFFICER	DATE

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CHECKLIST - SOURCE DOCUMENT REVIEW

CEM-2509 (Rev. 11/1998) (USE WITH FORM CEM-2508)

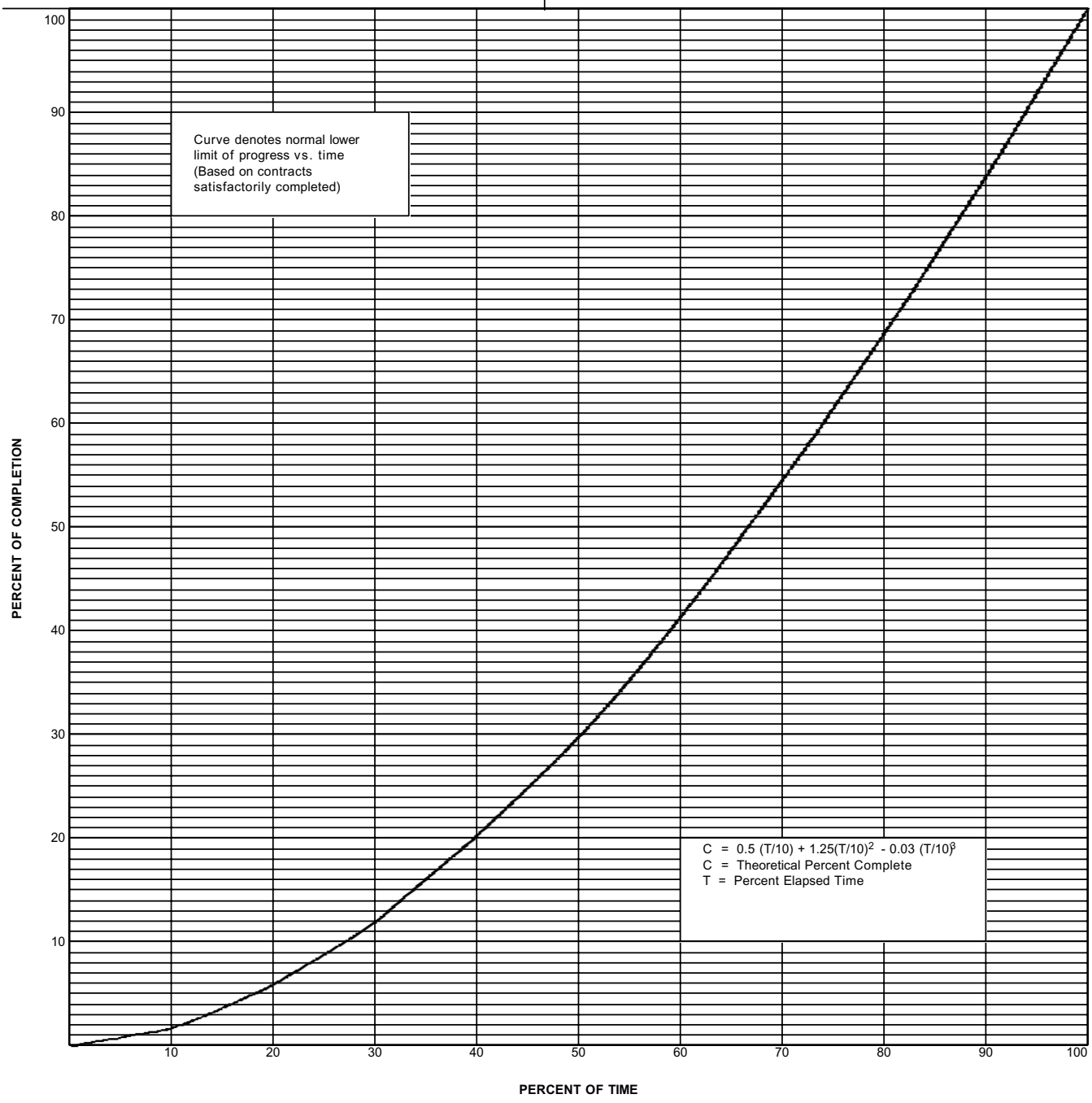
CONTRACTOR REVIEWED	CONTRACT NUMBER
COMPLETION DATE	R.E.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONSTRUCTION PROGRESS CHART

CEM-2601 (REV. 6/1983)

CONTRACT NUMBER	ROAD	BID
LIMITS		
DESCRIPTION		WORKING DAYS
RESIDENT ENGINEER	CONTRACTOR	



STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

WEEKLY STATEMENT OF WORKING DAYS

(JOB STAMP)

CEM-2701 (REV 02/2001) CT # 7541-3528

ADA Notice

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REPORT NUMBER

CONTRACTOR

WEEK ENDING *(month, day, year)*

Date	Day	Weather, Weather Conditions or Other Conditions[1]	Working Day	Nonworking Day	Working Day No Work Done on Controlling Operation[2]
	Monday				
	Tuesday				
	Wednesday				
	Thursday				
	Friday				
Days this week					
Days previously reported					
Total days to date					

Time Extensions[3]	CCO Numbers[4]	Days Approved	
		CCO	Other
Days this report			
Days previously reported			
Total days to date			

Computation of Extended Date for Completion	Number of Days	Numbered Day[5]	Date
1. First working day			
2. Working days specified in contract			
3. COMPUTED DATE FOR COMPLETION (line 1 + line 2 - 1)			
4. Days contract suspended to date			
5. Total time extension days approved to date *(CCO plus other)*			
6. Total Nonworking days to date[6]			
7. Subtotal **(line 4 + line 5 + line 6)**			
8. EXTENDED DATE FOR COMPLETION **(line 3 + line 7)**			
9. Revised working days for contract **(line 2 + line 5)**			
10. Total working days to date			
11. WORKING DAYS REMAINING **(line 9 - line 10)**			

CONTROLLING OPERATION(S)

REMARKS

The contractor will be allowed fifteen (15) days in which to protest in writing the correctness of the statement; otherwise, the statement shall be deemed to have been accepted by the contractor as correct.
NOTE: *Footnote Instructions to resident engineer are on reverse side.*

RESIDENT ENGINEER SIGNATURE

DATE

Distribution: Original -- Contractor; Copies -- District, resident engineer

FOOTNOTE INSTRUCTIONS TO RESIDENT ENGINEER

1. When recording nonworking days due to weather, ***state the reason why the day is unworkable*** when the weather description itself does not adequately describe conditions. For example, "clear-wet grade" to describe conditions when the weather is clear, but the grade is too wet to work. ***Do not*** list days merely as "Unworkable."

2. Enter days on which no productive work has been performed on the controlling operation(s) for reasons other than weather**.**

3. **Time Extensions**, **Other**, are to be explained under **Remarks** and the following information is to be included:

   a. *Cause of delay and specification reference under which approval was granted.*

   b. Statement as to what controlling operation or operations are being delayed and to what extent.

   c. Dates for which the extension was granted.

   d. Reference to supporting data.

4. List numbers of contract change orders providing for time extensions.

5. Do not include nonworking days which occur after expiration of the **Extended Date of Completion**. On contracts that are overtime, the total under Working Days shall not be greater than the total of **Revised Working Days (line 9)**. After approved total of working days has been reached, continue recording working and nonworking days but do not add into the totals. Make statement under **Remarks** that working and nonworking **days** are shown for record only since the contract time has elapsed.

   If an extension of time is subsequently approved, determine the new **Extended Date** by taking into account all nonworking ***days*** that are reachable.

6. From calendar issued by the Division of Construction with working days numbered for convenience in computations.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

OVERRUN IN CONTRACT TIME

CEM-2702 (REV 04/2001)

CONTRACT NO.	COUNTY, ROUTE, BRIDGE OR POST KILOMETERS	FEDERAL NO.

CONTRACTOR'S NAME

DATE WORK COMPLETED

DATE FOR COMPLETION (Including extensions authorized by the engineer)

CALENDAR DAYS OVERRUN	WORKING DAYS OVERRUN

The recommendation for acceptance of this contract was approved by the director subject to determination that if there was an overrun in contract time, a decision relative to assessing the contractor for liquidated damages or extending the contract time and charging the contractor for engineering and inspection costs would be deferred pending further study. The attached information (in the form of a memorandum or determination of claim) contains the result of the study.

RECOMMENDED ACTION CONCERNING TIME EXTENSION, LIQUIDATED DAMAGES AND ENGINEERING AND INSPECTION COSTS (Per Section 8-1.07, *Standard Specifications*):

☐ The detemination of claim for elimination of liquidated damages is that all of the time involved **was within the control of the contractor**. It is that **no extension of time be granted** and that the contractor be assessed liquidated damages of $ _____ per calendar day for the period from _____ to _____ , both dates inclusive, for a total of _____ days and $ _____ .

☐ A delay of _____ working days was caused by circumstances over which **the contractor had no control**. It is recommended that **a time extension of** _____ **working days be granted**. Such action will extend the date for completion to _____ , reducing the overrun to _____ calendar days. It is further recommended:

- ☐ That during the period of such extension **the contractor shall be charged** engineering and inspection charges in the amount of $_____ .
- ☐ That during the period of such extension **the contractor not be charged** engineering and inspection costs.
- ☐ That for the remaining overrun of _____ calendar days, from _____ to _____ both dates inclusive, **the contractor shall be assessed** liquidated damages of $ _____ per calendar day for a total amount of $ _____ .
- ☐ **The contractor has agreed to accept this decision** as to assessment of liquidated damages, and charges for engineering and inspection costs as full settlement of any claim for return of liquidated damages.

RECOMMENDED BY	APPROVED AS RECOMMENDED
	Director of Transportation
BY (Coordinator, Division of Construction)	BY (Chief, Division of Construction)
Date	Date

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

NOTICE OF MATERIALS TO BE USED

CEM-3101 (REV. 10/92) CT# 7541-3511-1

To: *(Resident Engineer)*	DATE:

You are hereby notified that materials required for use under Contract Number _____
for construction of _____

_____

in Dist. _____ *, Co.* _____ *, Rte.* _____ *, P. M.* _____
will be obtained from the following sources:

CONTRACT ITEM NO.	MATERIAL TYPE	NAME AND ADDRESS OF INSPECTION SITE

It is requested that you arrange for sampling, testing and inspection of materials prior to delivery in accordance with section 6 of the Standard Specifications where the same is practicable and in accord with your policy. It is understood that source inspection does not relieve me of the full responsibility for incorporating in the work, materials that comply in all respects with the contract plans and specifications. nor does it preclude the subsequent rejection of materials found to be unsuitable.

Yours truly,

_____
Contractor

WHITE - STRUCTURAL MATERIALS
DIV. OF MATERIALS ENGINEERING & TESTING SERVICES
5900 FOLSOM BLVD.
SACRAMENTO, CA 95819

CANARY - RESIDENT ENGINEER

PINK - CONTRACTORS FILE

GREEN - DISTRICT

BUSINESS ADDRESS	
BUSINESS PHONE	EXTENSION
( )	-

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INSTRUCTIONS TO CONTRACTOR

Section 6 of the Standard Specification states that, "Promptly after the approval of the Contract, the Contractor shall notify the Engineer of the proposed sources of supply of all materials to be furnished by him, using a form which will be supplied by the Engineer upon request."

In order to avoid delay in approval of materials, the Department of Transportation must receive notice as soon as possible.

Please comply with the following as closely as possible:

The Contract number and job limits should be the same as appears on the Special Provisions.

The column headed "Contract Item No." should show all the item numbers for which the material is to be used.

The column headed "Material Type" should be a description of the material and not necessarily the name of the contract item.

The column headed "Name and Address of Inspection Site" should be that of the actual source of supply and not subcontractor or jobber.

If the sources of all materials are not known at the beginning of a Contract, report those known. Supplemental "Notice of Materials to Be Used" should be submitted for the others as soon as possible thereafter. Do not delay submitting the original notice until all informaion is known.

All changes in kinds and/or sources of materials to be used should be reported on supplemental "Notices of Materials to Be Used" immediately.

Retain your copy and mail all other copies to the Resident Engineer.

Note: When placing orders for materials that required inspection prior to shipment, be sure to indicate on your order that State inspection is required.

AC PRODUCTION/PLACEMENT CHECKLIST

CEM-3501 (REV.11/2000)

PROJECT IDENTIFICATION

PROJECT EA	ROUTE	POST KILOMETERS	COMPLETION DATE (Contract)

COMPLETION DATE (Expected)	DATE PROBLEM DETECTED	CURRENT DATE	JOB SUSPENDED	AC (Tonnes Produced To Date)	AC (Tonnes Remaining)
			☐ YES ☐ NO		

PROBLEM STATEMENT

MIX PROPERTIES

TYPE MIX	TYPE GRADING	MAX GRADING (mm)	ADDITIVES	AGGREGATE TYPE	ASPHALT GRADE	
☐ A	☐ DENSE	☐ 38	☐ LIME	☐ A or	☐ AR-1000	☐ PBA-1
☐ B	☐ GAP	☐ 19	☐ LIQUID ANTI-STRIP	☐ B	☐ AR-2000	☐ PBA-1a
☐ RECYCLED	☐ OPEN GRADED	☐ 12.5	☐ CEMENT	☐ ABSORPTIVE or	☐ AR-4000	☐ PBA-2
	☐ COARSE	☐ 9.5	☐ OTHER	☐ NON-ABSORPTIVE	☐ AR-8000	☐ PBA-3
	☐ MEDIUM			☐ OTHER	☐ AR-16000	☐ PBA-4
						☐ PBA-5
						☐ PBA-6a
						☐ PBA-6b
						☐ PBA-7

APPEARANCE	PLANT TYPE
☐ OK	☐ BATCH or
☐ SEGREGATED	☐ CONTINUOUS
☐ RICH	☐ PORTABLE or
☐ DRY	☐ STATIONARY
☐ TENDER	
☐ COLOR	
☐ OTHER	

BACKGROUND DATA - Attach Test Method 109 verification, mix design, plant and street test results

ACTUAL ASPHALT CONTENT - Attach test results (including target asphalt content, source and date; note lift and location)

ACTUAL STABILITY OF STREET SAMPLES - Attach test results (note lift and location)

TEST MAXIMUM DENSITY - Attach test results (note lift and location)

MIX SUPPLIER AND LOCATION(S) -

FIELD CONDITIONS (at paving operation)

GENERAL	WEATHER	AIR TEMPERATURE (ºC)	SURFACE TEMPERATURE (ºC)	MIX TEMP AT PLANT (ºC)
☐ COASTAL	☐ CLEAR	☐ UNDER 4	☐ UNDER 4	☐ UNDER 121
☐ VALLEY	☐ CLOUDY	☐ 4-9	☐ 4-15	☐ 121-134
☐ MOUNTAIN	☐ FOGGY	☐ 10-15	☐ 16-26	☐ 135-162
☐ DESERT	☐ RAINY or WORSE	☐ 16-20	☐ 27-37	☐ 163-190
	☐ HUMID or	☐ 21-25	☐ 38-48	☐ 191-204
	☐ DRY	☐ 26-32	☐ 49-60	☐ GREATER THAN 204
	☐ WINDY or	☐ 33-38	☐ GREATER THAN 60	
	☐ CALM	☐ GREATER THAN 38		

MIX TEMP AT WINDOW (ºC)	MIX TEMP AT BREAKDOWN ROLLER (ºC)	DISTANCE, PAVER TO BREAKDOWN ROLLER (METER)	WINDOW LENGTH (Meter)	AVERAGE ONE WAY HAUL TIME (hours)
☐ UNDER 65	☐ UNDER 65	☐ UNDER 15	☐ 0	☐ UNDER 1/2
☐ 65-89	☐ 65-89	☐ 15-75	☐ 0-30	☐ 1/2-1
☐ 90-125	☐ 90-125	☐ 76-150	☐ 31-61	☐ 1-2
☐ GREATER THAN 125	☐ 126-150	☐ 151-229	☐ 62-91	☐ 2-3
	☐ GREATER THAN 150	☐ 230-300	☐ 92-122	☐ GREATER THAN 3
		☐ GREATER THAN 300	☐ 123-152	
			☐ GREATER THAN152	

CEM3501

AC PRODUCTION/PLACEMENT CHECKLIST

CEM-3501 (REV. 11/2000)

STRUCTURAL PROPERTIES

PAINT BINDER (tack coat)

- ☐ ASPHALT
- ☐ EMULSION
- ☐ OTHER

TACK SPREAD RATE (liters per metered square)

- ☐ 0.45
- ☐ 0.68
- ☐ 0.95
- ☐ 1.13
- ☐ OTHER

MIX THICKNESS (Compacted)

FIRST LIFT

SECOND LIFT

THIRD LIFT

UNDERLYING CONDITIONS

- ☐ AC
- ☐ PCC
- ☐ ATPB
- ☐ AB
- ☐ OTHER

- ☐ OK
- ☐ GRINDER PREPARED
- ☐ CRACK & SEAT
- ☐ PRE LEVELED
- ☐ CRACKED
- ☐ FABRIC
- ☐ OTHER

PAVER

MAKE

MODEL

PAVER OPTIONS

- ☐ PICKUP MACHINES
- ☐ SCREED EXT. (length)
- ☐ SKI (length)
- ☐ JOINT MATCHER
- ☐ GRADE WIRE
- ☐ OTHER

MECHANICAL PROPERTIES

- ☐ METHOD SPECIFICATION or
- ☐ END RESULT COMPACTION SPECIAL PROVISION

NUCLEAR DENSITY GAGE

MAKE

MODEL

CALIBRATION (date)

AVERAGE RELATIVE COMPACTION

BREAKDOWN ROLLER(S)	INTERMEDIATE ROLLER(S)	FINISH ROLLER(S)
TYPE	TYPE	TYPE
WEIGHT	WEIGHT	WEIGHT

IF VIBRATORY ROLLERS ARE USED:

ON CALTRANS APPROVED LIST ☐ YES ☐ NO

MAKE	SPEED	FREQUENCY	AMPLITUDE
MODEL	ACTUAL	ACTUAL	ACTUAL
	SPECIFIED	SPECIFIED	SPECIFIED

* A completed copy of this form should be filed in Category 35 of the Project Documents. A description of the form is included in the *Construction Manual*.

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

TEST RESULT SUMMARY

CEM-3701 (New 11/92)

MINIMUM FREQUENCY

JOB STAMP

INDEX

37.

MATERIAL

DATE SAMPLED	TEST NUMBER	SAMPLE LOCATION	TEST RESULTS				PRODUCTION QUANTITY REPRESENTED	REMARKS *

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CEM3701

* REFERENCE FAILING TEST CORRECTIVE ACTION

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

RELATIVE COMPACTION SUMMARY

CEM-3702 (REV. 10/92)

JOB STAMP

INDEX 37.

MATERIAL

TEST NO.	DATE	STATION	LOCATION	ELEVATION		MOISTURE		RELATIVE COMPACTION	STRUCTURAL DEPTH	REMARKS *
				BELOW FINISH GRADE	ABOVE FLOW LINE	FIELD	OPTIMUM			

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CEM3702

* REFERENCE FAILING TEST CORRECTIVE ACTION

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

MATERIALS RELEASE SUMMARY

CEM-4101 (NEW 6/94)

JOB STAMP:

Page _____ of _____

MATERIAL:				CONTRACT ITEM NO.
SOURCE OF MATERIAL (SUPPLIER):	DATE CEM-3101 SUBMITTED	MR-0608 (FURNISHED)	MR-0029 (SAMPLED)	

MATERIAL RELEASED BY DNTM&R (MR-0029) QUANTITIES DETERMINED FROM LAB RELEASES				MATERIAL RECEIVED ON PROJECT QUANTITIES DETERMINED BY ACTUAL COUNT, WEIGHTS, BILLS OF				CROSS INDEX WHERE RELEASE IS FILED BY ITEM NUMBER	REMARKS
DATE OF RELEASE	QUANTITY RELEASED	ACCUMULATED QUANTITY TO DATE	LOT NUMBERS	DATE RECEIVED	QUANTITY	ACCUMULATED QUANTITY TO DATE	LOT NUMBERS		

CEM-4101 (New 6/94)

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

JOB STAMP

MATERIAL INSPECTED AND RELEASED ON JOB

CEM-4102 (New 7/95)

MATERIAL	ITEM NUMBER
SUPPLIER	
DATE OF INSPECTION	QUANTITY INSPECTED (#/ UNIT)

BASIS FOR ACCEPTANCE - (INITIAL EACH CATEGORY)

- [ ] 1. CERTIFICATION OF COMPLIANCE (ATTACHED)
- [ ] 2. TEST RESULTS FROM MANUFACTURE (ATTACHED)
- [ ] 3. CERTIFICATE OF BUY AMERICA, AS APPLICABLE
- [ ] 4. VISUAL INSPECTION FOR OVERALL QUALITY, WORKMANSHIP, VERIFICATION OF MARKINGS
- [ ] 5. OTHER (EXPLAIN)

REMARKS:

INSPECTED BY:	RESIDENT ENGINEER SIGNATURE

CEM4102

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

MATERIAL PLANT SAFETY CHECKLIST

CEM-4202 (REV 11/2000)

NOTE: The contractor is responsible for all plant safety issues, regardless of any Caltrans' listing of acceptable or deficient items.

Report No.		Plant Owner	
Inspection By		Plant Location	
Inspection Date	District	Plant Make	Plant Type
EA		Plant Safety Certification Supplied By	Certification Date

INSPECTION AREA	PLANT FEATURE	spec	DEFICIENT	REMARKS
A. Asphalt Sample Area	1. Sampling height	☐		
	2. Plumbing size	☐		
	3. Insulation	☐		
	4. Shielding	☐		
	5. Housekeeping	☐		
	6. Fire protection	☐		
	7. Underground tank access	☐		
B. Aggregate/Cement Sample Area	1. Access stairs	☐		
	2. Access stairs, agg	☐		
	3. Access stairs, binder	☐		
	4. Guardrails	☐		
	5. Floor holes	☐		
	6. Housekeeping, agg	☐		
	7. Sample size, agg	☐		
	8. Sample size RAP	☐		
	9. Conveyor lockout, agg	☐		
	10. Conveyor lockout RAP	☐		
	11. Site, dust control	☐		
	12. Sample support rails	☐		
	13. Conveyor startup warning	☐		
C. Aggregate Belts and Drivers	1. Drive belt guards	☐		
	2. Conveyor guards	☐		
	3. Under conveyor clearance	☐		
	4. Other conveyors	☐		
D. Control Room	1. Stairs	☐		
	2. Landings	☐		
	3. Guardrails	☐		
	4. Fire protection	☐		
	5. Emergency exit	☐		
	6. First aid	☐		
	7. Drinking water	☐		
	8. Toilet facilities	☐		
E. Yard Equipment	1. Loaders	☐		
	2. Trucks	☐		
F. General Items	1. Lighting	☐		
	2. Wash pits	☐		
	3. Yard pits	☐		
	4. Electrical	☐		
	5. Auto control equipment	☐		

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

RESIDENT ENGINEER'S DAILY REPORT
ASST. RESIDENT ENGINEER'S DAILY REPORT

CEM-4501 (REV. 11/92) CT# 7541-3506-1

☐ **RESIDENT ENGINEER'S DAILY REPORT - FILE CAT. 45**

☐ **ASST. RESIDENT ENGINEER'S DAILY REPORT - FILE CAT. 46**

JOB STAMP

REPORT NO.	DATE M T W T F S S (Circle Day)
SHIFT HOUR: START STOP	TEMPERATURE MIN MAX

WEATHER

SIGNATURE	TITLE

CEM4501

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

ASSISTANT RESIDENT ENGINEER'S DAILY REPORT

CEM 4601 REV 4/1999 CT# 7541-3504-6

Job Stamp

Report No. _____

Date _____

M T W T F S S Circle

Shift Hours Start _____ Stop _____

ASSISTANT RESIDENT ENGINEER'S DAILY _____ **REPORT**

Location & Description of Operation _____

HOURS - ITEM NO.

WEATHER

EQUIPMENT AND / OR LABOR:

EQPT. NO.	NO. PERSONS	DESCRIPTION (Of Equipment or Labor)									IDLE OR DOWN	REMARKS (Reason for Idleness or other remarks)

Signature | Title

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91-92184

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

DRAINAGE SYSTEM SUMMARY

CEM-4701 (REV 05/2001) CT# 7541-3521-2

(SEE REVERSE FOR PAGE 2)

JOB STAMP

DRAINAGE SYSTEM NUMBER

PLAN. STA.	"AS BUILT" STA.

PROGRESS RECORD

STAKED: BY:

ITEM NUMBER										
DATE	ENGR.									REMARKS

ESTIMATE OF WORK COMPLETED

ITEM NUMBER																
		REF.		REF.		REF.		REF.		REF.		REF.		REF.		REF.
PLAN Q																
#																
#																
#																
#																
#																
#																
#																
ADJUST Q																
ACTUAL Q																

DRAINAGE SYSTEM SUMMARY

CEM-4701 (REV 05/2001) CT# 7541-3521-2

(SEE REVERSE FOR PAGE 1)

PIPE STATION	ROD	GROUND ELEV.	GRADE ELEV.	CUT / FILL	PAY DEPTH

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

QUANTITY CALCULATIONS

CEM-4801 (REV 11/1992) CT# 7541-3520-0

SHEET OF

JOB STAMP	ITEM	FILE NO.
	LOCATION	SEGREGATION YES ☐ NO ☐
	CALC. BY	DATE
	CHK. BY	DATE

POSTED BY DATE POSTED TO

CEM4801

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONTRACT CHANGE ORDER

CEM-4900 (REV 05/2001) CT# 7541-3501-0

Sheet _____ of _____

Change Requested by: ☐ engineer ☐ contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NUMBER	ROAD	FEDERAL NUMBER(S)

TO

contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the engineer.***

Description of work to be done, estimate of quantities and prices to be paid. (Segregate between additional work at contract price, agreed price and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the engineer's estimate.

Estimated Cost: ☐ Decrease ☐ Increase $

By reason of this order the time of completion will be adjusted as follows:

SUBMITTED BY

SIGNATURE	(PRINT NAME & TITLE)	DATE

APPROVAL RECOMMENDED BY

SIGNATURE	(PRINT NAME & TITLE)	DATE

ENGINEER APPROVAL BY

SIGNATURE	(PRINT NAME & TITLE)	DATE

We the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment therefor the prices shown above. **NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.**

CONTRACTOR ACCEPTANCE BY

SIGNATURE	(PRINT NAME & TITLE)	DATE

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONTRACT CHANGE ORDER

CEM-4900 (REV 05/2001) CT# 7541-3501-0

Sheet _____ of _____

Change Requested by: ☐ engineer ☐ contractor

CCO NUMBER	SUPPL. NUMBER	CONTRACT NUMBER	ROAD	FEDERAL NUMBER(S)

TO

contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the engineer.***

Description of work to be done, estimate of quantities and prices to be paid. (Segregate between additional work at contract price, agreed price and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the engineer's estimate.

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONTRACT CHANGE ORDER INPUT

CEM-4901 REV 5/1993 CT# 7541-3516-2

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C A S O A C

CONTRACT NO. 4 CCO NO. SUPPL.

CONSTRUCTION DEPT. USE ONLY ☐ FUNCTION ☐ OVERRIDE

CARD TYPE 1

C. C. O. DESCRIPTION

NET $ CHANGE THIS CCO

APPROVAL DATE

TIME EXTENSION DAYS

CATEGORY

CARD TYPE 2

PAYMENT METHOD

$ AMOUNT

EW ☐ AC ☐ FA ☐ LS ☐ UP ☐

EW ☐ AC ☐ FA ☐ LS ☐ UP ☐

EW ☐ AC ☐ FA ☐ LS ☐ UP ☐

CARD TYPE 4

NET $ AMOUNT BRIDGE WORK THIS CCO

CARD TYPE 3

ITEM NUMBER QUANTITY

ITEM NUMBER QUANTITY

CARD TYPE 5

FEDERAL PARTICIPATION

P = PARTICIPATING

M = NON-PARTICIPATING (MAINTENANCE)

N = NON-PARTICIPATING (OTHER THAN MAINTENANCE)

R = NON-PARTICIPATING (REIMBURSEMENT BY OTHERS)

S = PARTICIPATING IN PART

IF PARTICIPATING IN PART (S), BREAKDOWN COST AS FOLLOWS: (INPUT TYPE AS P,M,N,R)

TYPE COST

FEDERAL SEGREGATION (IF MORE THAN ONE FUNDING SOURCE)

☐ E = CCO to be funded as per contract ☐ F = CCO to be funded as follows:

FEDERAL FUNDING SOURCE PERCENT

IN CASE OF QUESTIONS CONTACT: *NAME* BUSINESS PHONE VERIFY

CEM-4901 REV 5/1993

CONTRACT CHANGE ORDER INPUT

CEM-4901 REV 5/1993 CT# 7541-3516-2

HEADING	INSTRUCTIONS
Contract Number	Required
CCO Number	Enter CCO and Supplement Numbers.
CARD TYPE 1	
CCO Description	CCO Description must be entered.
Net Money Change This CCO	Enter the amount of change. Enter zero if there is no net change. Indicate negative or positive amount.
Approval Date	Enter the month, day, year and the Approval Date. The change order will not be filed until it has been approved.
Time extension days	One of the following entries must be made: 1. Enter zero if there is no time extension. 2. Enter the number of Time Extension Days. 3. Enter "DEF" if consideration of a time extension has been deferred.
Category	Enter alpha-numeric code. Left justify if less than four characters.
CARD TYPE 2	
EW or AC	Mark either the Extra Work or the Adjustment of Compensation boxes.
Payment Method	Mark one of the three Payment Method boxes, Force Account, Lump Sum or Unit price.
$ Amount	Enter the dollar amount of the change.
CARD TYPE 3	
Item Number Quantity	Enter the contract item number and the quantity change for each item shown on the change order.
CARD TYPE 4	
Bridge Work	Enter the net amount of Bridge Work contained in this change order. Leave blank if zero.
CARD TYPE 5	
Federal Participation	Enter FHWA Funding Participation determination on every change order.
Participating-in-Part funding	Indicate breakdown for Participating-in-Part funding.
Federal Segregation	If more than one funding source, mark if the CCO is to be funded as prescribed in contract or show the percentage allotted to each Federal funding source.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

EXTRA WORK BILL (SHORT FORM)

CEM-4902 REV 7/94 CT# 7541-3500-8

ADA Notice

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CASEWB

CONTRACT NO.	CCO NO.	REPORT NO.

	DATE PERFORMED	DATE OF REPORT	CONTRACTOR. JOB	CONTRACTOR. RPT. NO.	E.W. + -	E.W. F	E.W. LS	E.W. UP	A.C. F	A.C. LS	A.C. UP	BR SW	* 50% FLAG	SUB WORK	R/W DELAY	PARTNERING SWITCH	LABOR SUR	WCI CLASS	WCI RATE
01																			

02 WORK PERFORMED BY

03 DESCRIPTION OF WORK

EQUIPMENT CHARGES

	EQUIPMENT ID NUMBER	EQUIPMENT DESCRIPTION CLASS	MAKE	CODE	ATTACH	REGULAR HOURS	OVERTIME HOURS
04							
05							
06							
07							
08							
09							
10							

FOR RESIDENT ENGINEERS ONLY

☐ NEW BILL ☐ APPROVED FOR PAYMENT

☐ RESUBMITTAL ☐ RETURNED FOR CORRECTION

DATE RECEIVED | DATE OF ACTION

MATERIAL and/or WORK DONE BY SPECIALIST OR LUMP OR UNIT PRICE PAYMENTS

	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
24	INVOICE DESCRIPTION	UNITS	UNIT COST OR NET PAY		
25	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION	UNITS	UNIT COST OR NET PAY		

LABOR CHARGES

	CRAFT ID	LABOR NAME INT	LABOR NAME LAST	LABOR REGULAR HOURS HRS	LABOR REGULAR HOURS RATE	OVERTIME HOURS HRS	OVERTIME HOURS RATE	SUBSISTENCE UNITS	SUBSISTENCE RATE
34									
35									
36									
37									
38									
39									
40									

SIGNATURE OF RESIDENT ENGINEER

IN CASE OF QUESTIONS CONTACT: (*Resident Engineers Use Only*)

SIGNATURE OF PRIME CONTRACTORS REPRESENTATIVE

NAME

BUSINESS PHONE

FM 94 2020 M **WHITE** - DATA ENTRY **CANARY** - RESIDENT ENGINEER **PINK** - CONTRACTOR (*After Approval*) **GOLDENROD** - CONTRACTOR

EXTRA WORK BILL *(SHORT FORM)*

CEM-4902 REV 7/94 CT # 7541-3500-8

Preparing Form CEM 4902

This form is provided for entry of basic information related to extra work performed on a Contract Change Order. The majority of all Extra Work Bills will fit on this form. If more entries are required for equipment, labor or material, you must use the four part forms. (CEM-4902A, CEM-4902B, CEM-4902C, CEM-4902D)

The top of this form includes fields that are used to record basic information required on all Extra Work Bills. Following is a list of these fields: All switch fields, Bridge, flagging, sub work, R/W Delay and Partnering are set by entering a "Y" in the appropriate box. To remove a switch from an existing bill, place an "N" in the appropriate box.

FIELD	REMARKS
Contract Number	Identifies the project. Must be a valid contract number that is on file in the Progress Pay System.
CCO Number	Identifies the Contract Change Order.
Report Number	This is assigned by the submitter *(R.E.),* in sequential order beginning with 0001 for each CCO.
Line 01:	
Date Performed	Enter the work performed date. "VAR" may be entered in this field if the pay method is lump-sum or unit-price and equipment.
Date of Report	Enter the date the bill is prepared.
Contractor. Job No.	This is used by the contractor to identify the extra work bill.
Contractor. Rpt. No.	This is used by the contractor to identify the extra work bill.
Payment Method	Required entry. Indicate + or -, and place an "X" in the appropriate box. A blank is considered a +.
BR SW	Set to "Y" in if the CCO indicates work on structure items.
50% Flag	Set to "Y" if the bill is for flagging. This will reduce the bill by 50%.
Sub Work	Set to "Y" to add subcontractor markup.
R/W Delay	Set to "Y" if bill is for right of way delay. No markup will be applied to the bill.
Partnering Switch	Set to "Y" if bill is for partnering. No markup will be applied to the bill.
Labor Sur	Enter the labor surcharge for the type of work normally performed by that contractor.
Line 02 and 03	
Work Performed By	Identify the party that is performing the work.
Description of Work	Identify the location and description of the work.
Lines 04 -10 Equipment Charges	
Equipment Description	Enter equipment ID, Class, Make, Code. If any are missing the bill will not be accepted.
Equipment Attachments	Enter attachment codes.
Equipment Hours	Enter regular and overtime hours. Hours must be greater than zero.
Lines 24 -25 Materials and/or Work done by Specialist or Lump or Unit Price Payments	
Vendor Name	Enter the vendor's name.
Invoice data	Enter the invoice number, date, and description.
Invoice units & cost	Enter the number of units and the unit cost or net pay.
Lines 34 - 40 Labor Charges	
Labor Description	Enter labor craft, initial and last name.
Labor Hours & Rate	Enter regular and overtime hours and rates. Hours and rates must not be zero.
Subsistence	Enter subsistence hours and rate if subsistence was paid.

CEM4902

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

EXTRA WORK BILL-TITLE PAGE

CEM-4902A NEW 7/94 CT# 7541-3496-7

CASEWB

CONTRACT NO.	CCO NO.	REPORT NO.	PAGE 1 OF

				E.W.				A. C.						
				+/-	FA	LS	UP	FA	LS	UP	BR	* 50% FLAG	SUB WORK	R/W DELAY	PARTNERING SWITCH
01	DATE PERFORMED	DATE OF	CON. JOB. NO.	CONT. RPT. NO											

02 WORK PERFORMED BY

03 DESCRIPTION OF WORK

FOR RESIDENT ENGINEERS USE ONLY

- ☐ New Bill
- ☐ Approved for Payment
- ☐ Resubmittal
- ☐ Returned for Correction

DATE RECEIVED

DATE OF ACTION

ATTACHED TO THIS BILL ARE:

- ☐ Labor Charges CEM-4902B
- ☐ Equipment Charges CEM-4902C
- ☐ Material Charges CEM-4902D

TOTAL COST SUMMARY, STANDARD MARK-UPS & SUBCONTRACTOR MARK-UP

Total Equipment (A)		Total Other Expense (F)	
Total Materials (B)		Subtotal (C) + (D) + Regular Surcharge + Premium Surcharge + (E) + (F)	
Subtotal Equipment & Materials (A) + (B)		% Standard Mark-up	
% Standard Mark-up		**Total Labor (C) + (D) + Surcharge + (E) +(F) + Mark-up**	
Total Equipment & Materials (A) + (B) + Standard Mark-up		**Total Equipment & Materials**	
Total Regular Labor (C)			
% Regular Labor Surcharge		**Total Equipment & Materials + Total Labor**	
Total Premium Labor (D)		% of Mark-up on Subcontracted Work (Only)	
% Premium Labor Surcharge		**GRAND TOTAL**	
Subtotal Regular & Premium (C+D)			
Subtotal (C) + (D) + Regular Surcharge + Premium Surcharge			
Total Subsistence (E)			

SIGNATURE *(Resident Engineer)*	**IN CASE OF QUESTION:** ***(Resident Engineer Use Only)***	
SIGNATURE *(Prime Contractor's Representative)*	NAME	BUSINESS PHONE

WHITE - Data Entry **CANARY** - Resident Engineer **PINK** - Contractor *(After Approval)* **GOLDENROD** - Contractor

CEM4902A

EXTRA WORK BILL-TITLE PAGE

CEM-4902A NEW 7/94 CT# 7541-3496-7

Preparing Form CEM 4902A

Form CEM 4902A is provided for entry of basic information related to extra work performed on a Contract Change Order. It is the first of four input forms used to file the Extra Work Bill and are required for each billing. Entries in the shaded areas will not become part of the electronic copy of the bill and are for the user's information only.

The top of this form includes fields that are used to record basic information required on all Extra Work Bills. Following is a list of these fields: All switch fields, Bridge, flagging, sub work, R/W Delay and Partnering are set by entering an "Y" in the appropriate box. To remove a switch from an existing bill, place an "N" in the appropriate box.

FIELD	REMARKS
Contract Number	Required entry
CCO Number	Required entry
Report Number	Required entry. This number is assigned by the submitter (R.E.), in sequential order beginning with 0001 for each CCO.
Date performed	This is required entry. "VAR" may be entered in this field if the pay method is lump-sum or unitprice and forms for equipment and labor bill ***are not used.***
Date of Report	Required entry.
Cont. Job No.	Optional entry.
Cont. Rpt. No.	Optional entry.
Payment Method	Required entry. Indicate + or -, and place an "X" in the appropriate box. A blank is considered a +
BR Switch	Place a "Y" in this box if bridge work is involved. Use an "N" to remove BR Switch.
50% Flag	Place a "Y" in this box if pay is for 50% flagging. Use an "N" to remove 50% flagging.
Sub Work	Place a "Y" in this box if 5% Sub contractor markup is involved. Use "N" to remove Sub contractor markup.
R/W Delay	Place a "Y" in this box to indicate R/W delay. Use an "N" to remove R/W Delay.
Partnering Switch	Place a "Y" in this box to indicate this bill is for Partnering cost billing.
Work Performed By	Optional
Description of Work	Optional

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

EXTRA WORK BILL - LABOR CHARGES

CEM-4902B NEW 7/94 CT# 7541-3497-9

CASEWB

CONTRACT NO.	CCO NO.	REPORT NO.	LABOR SURCHARGE	WCI CLASS	WCI RATE	PAGE
						1 of

	CRAFT ID	NAME		REGULAR HOURS			PREMIUM HOURS			SUBSISTENCE		
		INT	LAST	HRS	RATE		HRS	RATE		UNITS	RATE	TOTAL
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
OTHER EXPENSES SUBJECT TO LABOR MARKUP					TOTAL *(C)*			TOTAL *(D)*			TOTAL *(E)*	

	DESCRIPTION	AMOUNT
54		

TRAVEL EXPENSE		EXTENDED TOTAL *(F)*
UNITS	RATE	

SIGNATURE *(Resident Engineer)*

SIGNATURE *(Prime Contractor's Representative)*

IN CASE OF QUESTION:
(Resident Engineer Use Only)

NAME

BUSINESS PHONE

WHITE - Data Entry **CANARY**- Resident Engineer **PINK** - Contractor *(After Approval)* **GOLDENROD** - Contractor

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

EXTRA WORK BILL - LABOR CHARGES

CEM-4902B NEW 7/94 CT# 7541-3497-9

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Preparing Form CEM 4902B

Form CEM 4902B is provided for entry of the contractor labor costs used to perform work on a contract change order. Information in the shaded area will not become part of the electronic copy of the bill. The top of this form includes fields that are used to record or calculate labor surcharges. Following is a list of these fields:

FIELD	REMARKS
Contract Number	Required entry, same as on the Title Page
CCO Number	Required entry, same as on the Title Page
Report Number	Required entry, same as on the Title Page
Labor Surcharge	Enter Surcharge percent as a whole number. Use Surcharge rate that was in effect when the work was done. This percent surcharge will apply to all labor lines on this Bill.
WCI Class	Optional entry. Choose one of the WCI Classes G01, S01-S09, or D01
WCI Rate	Enter WCI rate if the WCI Class is entered. This rate will apply to all labor lines on this Bill and must be substantiated by the Contractor.
Craft ID	Required entry.
Name - Initial	Required entry.
Name - Last	Required entry.
Regular Hours - Hours	Enter number of regular hours worked.
Regular Hours - Rate	Enter the regular rate.
Premium Hours - Hours	Enter number of Premium hours worked.
Premium Hours - Rate	Enter the Premium rate.
Subsistence - Units	Enter the Units if subsistence was paid.
Subsistence - Rate	Enter the Rate if subsistence was paid.
Other - Description & Amount	Optional entry for expenses not included in equipment, labor or invoices.
Travel Expenses - Units & Rate	Optional entry when travel expense was required.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

EXTRA WORK BILL - EQUIPMENT CHARGES

CEM-4902C NEW 7/94 CT# 7541-3498-1

CASEWB

CONTRACT NO.	CCO NO.	REPORT NO.	PAGE of

	EQUIP ID NUMBER	EQUIPMENT DESCRIPTION				REGULAR HOURS	OVERTIME HOURS	REG RATE	OT RATE	EXTENDED AMOUNT
		CLASS	MAKE	CODE	ATTACH					
04										
05										
06										
07										
08										
09										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										

SIGNATURE OF RESIDENT ENGINEER	*IN CASE OF QUESTION CONTACT: (RESIDENT ENGINEERS USE ONLY)*	**TOTAL (A)**	
SIGNATURE OF PRIME CONTRACTORS REPRESENTATIVE	NAME	BUSINESS PHONE	

WHITE - DATA ENTRY **CANARY**- RESIDENT ENGINEER **PINK** - CONTRACTOR (AFTER APPROVAL) **GOLDENROD** - CONTRACTOR

CEM4902C

Preparing Form CEM-4902C

Form CEM-4902C is provided for entry of the contractor equipment costs used to perform work on a contract change order. Information in the shaded area will not become part of the electronic copy of the bill. Following is a list of these fields:

FIELD	REMARKS
Contract No.	Required entry, same as on the Title Page
CCO No.	Required entry, same as on the Title Page
Report No.	Required entry, same as on the Title Page
Equipment ID	Required entry. Enter the equipment's I.D. number.
Equipment Description	Each piece of equipment is identified by code. This code is either in the Equipment Rental Rate Book or is included in the Miscellaneous Equipment Listing.
Equipment Class	Required entry. In the Equipment Rental Rate book, this code is included in the heading for the class of equipment and is set off by brackets [ ].
Equipment Make	Required entry. In the Equipment Rental Rate book, this code is included in the subheading adjacent to the Manufacturer's name and is set off by brackets [ ].
Equipment Code	Required entry. In the Equipment Rental Rate book, this code is included in the line of the equipment being identified under the subheading "CODE".
Attach	Optional entry. In the equipment Rental Rate Book, the attachment codes are in the class "ATTACHMENTS" and are identified under the subheading "CODE."
Regular Hours	Enter the number of Regular hours worked.
Premium Hours	Enter the number of Premium hours worked.

NOTE: If the equipment was on R/W delay, place a "Y" in the R/W Delay box on the Title Page Form.

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

EXTRA WORK BILL - MATERIAL CHARGES

CEM-4902D NEW 7/94 Front CT# 7541-3499-3

CASEWB

MATERIAL and/or WORK done by specialist or Lump Sum or Unit Price Payments

CONTRACT NO.	CCO NO.	REPORT NO.	PAGE
			1 of

	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
24	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			
25	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			
26	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			
27	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			
28	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			
29	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			
30	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			
31	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			
32	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			
33	VENDOR NAME	INVOICE NUMBER	MO	DAY	YR
	INVOICE DESCRIPTION / UNITS / UNIT COST OR NET PAY	EXTENDED TOTAL			

SIGNATURE OF **RESIDENT ENGINEER** | SIGNATURE OF **PRIME CONTRACTOR'S REPRESENTATIVE** | **INVOICE**

WHITE - DATA ENTRY **CANARY**- RESIDENT ENGINEER **PINK** - CONTRACTOR (AFTER APPROVAL) **GOLDENROD** - CONTRACTOR

Preparing Form CEM-4902D

Form CEM 4902D is provided for entry of the contractor material and/or work done by specialist or LUMP SUM or UNIT PRICE PAYMENTS. It is not practical to use the Extra Work Bill to compute invoices, due to tax and discount; the net amount of the invoice should be entered as a unit. Information in the shaded area will not become part of the electronic copy of the bill. Following is a list of these fields:

FIELD	REMARKS
Contract No.	Required entry, same as on the Title Page
CCO Number	Required entry, same as on the Title Page
Report No.	Required entry, same as on the Title Page
Vendor Name	Optional entry.
Invoice Number	Optional entry.
Invoice Date	Optional entry. "VAR" is an acceptable invoice date entry.
Invoice Description	Optional entry.
Units	Required entry. Both lump-sum and unit-price entries require a unit to be input.
Unit Cost or Net Pay	Required entry.

NOTE: The Material entry will not be processed unless there is a value in both the Unit and the Unit Cost fields.

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

Page 1 of _____

CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 REV 5/2001 CT#7541-3544-0

DATE

TO	FILE E. A. _____ CO-RTE-PM _____ FED NO. _____
FROM	
CCO NO. / SUPPLEMENT NO. / CATEGORY CODE _____ _____ _____	CONTINGENCY BALANCE (Including this change): $
$ ☐ INC ☐ DECR	HEADQUARTERS APPROVAL REQUIRED? ☐ YES ☐ NO
SUPPLEMENTAL FUNDS PROVIDED $	IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☐ YES ☐ NO

THIS CHANGE ORDER PROVIDES FOR (Use additional pages as needed):

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

ESTIMATE OF COST

	THIS REQUEST	TOTAL TO DATE
ITEMS		
FORCE ACCOUNT		
AGREED PRICE		
ADJUSTMENT		
TOTAL		

FEDERAL PARTICIPATION

☐ PARTICIPATING ☐ PARTICIPATING IN PART ☐ NONE

☐ NON-PARTICIPATING (Maintenance) ☐ NON-PARTICIPATING

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

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CONTRACT CHANGE ORDER MEMORANDUM

CEM-4903 REV 5/2001 CT#7541-3544-0

THIS CHANGE ORDER PROVIDES FOR (Use additional pages as needed):

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

JOB STAMP

REQUEST FOR PAYMENT FOR MATERIALS ON HAND

CEM-5101 REV 5/2001 CT# 7541-3522-4

ADA Notice

For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 263-2041 or TDD (916) 263-2044 or write Records and Forms Managment, 1120 N Street, MS-89, Sacramento, CA 95814.

TO: RESIDENT ENGINEER *(Name)*	**FROM:** CONTRACTOR *(Name of Company)*	DATE

In accordance with the provisions of Section 9-1.06 of the Standard Specifications, request is made for payment as "Materials on Hand" for the following materials:

ITEM NUMBER	QUANTITY	MATERIAL DESCRIPTION	VALUE	TYPE OF SUBSTANTIATING EVIDENCE OF PURCHASE ATTACHED	WHERE STORED *

AFFIDAVIT:

The materials listed above have been purchased exclusively for use on the above-referenced project. The material is separated from other like materials and is physically identified as our property for use on Contract _____. The State may enter upon the premises for the purposes set forth in Section 6 of the Standard Specifications for inspection, checking or auditing, or for any other purpose you consider necessary. It is expressly understood and agreed that this information and affidavit are furnished to the State for the purpose of obtaining payment for the above materials before they are delivered to, or incorporated into, the project described above, and that the storage thereof at the location shown is subject to, and under the control of, the State. A revised form showing the current status of the value of materials for which payment is being requested will be submitted each estimate period.

SIGNATURE OF CONTRACTOR

* When stored at a location other than on the jobsite or at a fabricator's yard, a warehouse receipt for the materials issued in the name of the State shall accompany the request for payment. In case the storage location (other than the jobsite or fabricator's yard) is the Contractor's property, the area containing the material to be paid for shall be fenced and posted to indicate that the material within the fenced area is under the control of the State.

INSTRUCTIONS TO CONTRACTOR:
Submit original and one copy to Resident Engineer not later than one week prior to the end of the estimate period. Attach evidence of purchase (and warehouse receipt when required) to original.

INSTRUCTIONS TO RESIDENT ENGINEER:
Forward duplicate to Division of New Technology, Materials and Research.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT RECORD - ESTIMATE REQUEST

CP-CEM 6001 (REV 6/1999)

Contract Number ___ – ____ 4 (1, 3)

CASØAE

1. ESTIMATE PARAMETERS:

A. Estimate Number (10)

B. Estimate for Work Performed Through (12) — —

C. Type of Estimate Requested:

1) Monthly Construction Progress Estimate (18)

2) Progress Estimate After Acceptance (19)

D. Contract Progress:

1) Estimated Date of Completion (or Date of Completion) (20) — —

2) Chargeable Working Days (26)

Nonworking Days + Suspension Days (30)

Time Extension Days (CCO) (33) + - (34)

Time Extension Days (Other) (37)

3) If on Plant Establishment Period:

Progress is satisfactory (40)

Progress is ***not*** satisfactory (41)

E. District Office Use Only

1) Unusual Progress Conditions:

a) Override Unsatisfactory Progress (42)

b) Percent Time Elapsed ***will be*** equal to (43) %

c) (46)

2) Estimate Type:

a) Supplemental Progress Estimate (71)

b) Proposed Final Estimate (72)

c) Semifinal Estimate (73)

d) Final Estimate (74)

3) Indicate if this is a rerun of a prior estimate (75)

2. DEDUCTIONS:

TYPE (10)	DESCRIPTION (13)	+ - (33)	AMOUNT * (34)
			, , .
			, , .
			, , .

* NOTE: USE MINUS SIGN TO TAKE A DEDUCTION; PLUS SIGN INDICATES RETURN OF A PREVIOUS DEDUCTION.

IN CASE OF QUESTION CONTACT:

NAME		VERIFY
PHONE	DATE	

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONTRACT ADMINISTRATION SYSTEM (CAS) - REPORT REQUESTS

CEM-6002 (REV. 02/2001)

To: EDP: Please obtain the reports indicated below.

NOTE: See Section 5-1 of the *Construction*

Priority Class ☐ S/C 5092

Procedure: **CASRPT**

REQUESTS R 1 — TITLE OF REPORT		SELECTION CRITERIA S 1 — DISTRICTT (2–3)	(4–10)
DISTRICT (XX) ESTIMATE STATUS	☐ 2		
PROJECT MANAGEMENT (Exceptional Contracts, Project File Status and Summary of Control Report)	☐ 3		
DISTRICT (XX) PROJECT STATUS	☐ 4		
PROGRESS PAYMENT-WORK DONE BY OFFICE OF STRUCTURES	☐ 5		
PROJECT RECORD ESTIMATE (Schedule of Extra Work, Schedule of Deductions, Project Record Estimate, Progress Payment Voucher)	☐ 6		
STATUS OF CONTRACT ITEMS	☐ 7		
PROJECT RECORD ITEM SHEET	☐ 8		
STATUS OF PROJECT CHANGE ORDERS	☐ 9		
CCO MASTER LISTING	☐ 10		
BRIDGE QUANTITIES BY STRUCTURE	☐ 11		
DISTRICT (XX) STATUS OF ANTICIPATED CHANGES	☐ 12		
PROJECT RECORD-ESTIMATE (DUMMY)	☐ 13		
CONTRACT CONTENTS REPORT	☐ 14		
CONTRACT CONTENTS REPORT (Contract Item Records)	☐ 15		
CONTRACT CONTENTS (Contract Progress)	☐ 16		
DEWRS IN HOLDING FILE	☐ 17		
RENTAL RATES & CODES FOR MISCELLANEOUS EQUIPMENT	☐ 18		

IN CASE OF QUESTION CONTACT

S/C 5092

NAME _____

PHONE _____ DATE _____

VERIFY

PAGE_____ OF _____

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROGRESS PAY-ESTIMATE PROJECT INITIATION OR UPDATE

CEM-6003 (REV 02/2001)

CASOOA

PROJECT KEY		
FB	DIST.	CONTRACT NUMBER
		4
1	2 3	4 9

INSTRUCTIONS FOR CARD C05
-CONTRACT SUSPENSION: ENTER SUSPENSION DATE AND 'S' IN SR
-CONTRACT REACTIVATION: ENTER REACTIVATION DATE AND 'R' IN SR
-FOR CORRECTION: ENTER CORRECT DATE OR 00/00/0000 AND 'C' IN SR
-FOR PROJECT REQUIRING 5% RETENTION: ENTER 'X' IN PE
-FOR PROJECTS AWARDED AFTER 1/1/88;
ENTER DATE WHICH IS 15 CALENDAR DAYS AFTER APPROVAL DATE IN BEGIN CONSTRUCTION DATE

MISCELLANEOUS INPUT

CC	CARD TYPE	RESIDENT ENGINEERS PHONE NUMBER	RESPON. UNIT	DATE WORK STARTED	EST. DATE FOR COMPLETION	PASSWORD	SUSPENSION OR REACTIVATION DATE	SR	PE	BEGIN CONSTRUCTION DATE
C	05									

RESIDENT ENGINEERS MAILING ADDRESS

C	06
C	07
C	08

CONTRACTOR NAME AND ADDRESS

C	09	NAME
C	10	
C	11	
C	12	
C	13	ADDRESS
C	14	

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CONTRACTORS PHONE NUMBER

BRIDGE DEPARTMENT DATA

CC	CARD TYPE	BRIDGE REP. NAME	RESPON. UNIT	ORIGINAL AUTHORIZED AMOUNT FOR BRIDGE WORK *	MOBIL %	C
C	15			, ,		

* (INCLUDE MOBIL AMT.)

BY: _____

REMARKS _____

NAME		VERIFY
PHONE	DATE	

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONTRACT TRANSACTIONS INPUT

CEM-6004 (Rev. 10/1983) CT#7541-3515-0

1 DIST | 3 CONTRACT NO. 4 | 9 PASSWORD

CASØA

PAGE NO. 15 17

LINE NO. 18	DATE MO. 20	DATE DAY 22	SOURCE DOCUMENT DESCRIPTION 24–43	BRIDGE	CONTRACT ITEM ENTRIES: ITEM NO. 45	+ - 48	QUANTITY (UNITS) 49–60	CODE	ALL OTHER ENTRIES: CCO NO. 62–64	+ - 65	AMOUNT($) 66	TYPE 74	ENT BY	✓ BY
01							, ,				,			
02							, ,				,			
03							, ,				,			
04							, ,				,			
05							, ,				,			
06							, ,				,			
07							, ,				,			
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18							, ,				,			
19							, ,				,			
20							, ,				,			
21							, ,				,			
22							, ,				,			
23							, ,				,			
24							, ,				,			

IN CASE OF QUESTION CONTACT: NAME _____

PHONE _____

VERIFY

93 95682

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
CEM-6004 (Rev. 10/1983) CT#7541-3515-0

CONTRACT TRANSACTIONS INPUT

1. Enter district and contract numbers on each input page.
2. Enter the password assigned to this contract number.
3. Assign page numbers sequentially throughout the life of the contract starting with Page Number 001. Be careful. This number is important.
4. Each line entry must include the date and a source document description. All source documents are to be cross referenced to this input page using the page and line numbers and the "date of entry." There are two classes of transaction entries.

A. Contract Item Transactions:

TRANSACTION TYPE	ITEM NO.	QUANTITY	CODE
Item Payment	Enter	Enter	Blank
Item Quantity Balance	Enter	Enter	Q
Anticipated Change to Item	Enter	Enter	A
*Item Final Balance	Enter	Blank	F
*Item Final Balance (Reopen)	Enter	'Reopen'	F

*Source Document Description may be left blank and a standard description will be supplied.

B. All Other Entries:

TRANSACTION TYPE	CCO NO.	AMOUNT	TYPE
Anticipated Change	Blank	Enter	ANT
Materials on Hand	Blank	Enter	MHS
SFM & E Allotment Change	Blank	Enter	SFM
Total Allotment Change	Blank	Enter	TAC
Anticipated Change to CCO	Enter	Enter	ACC
*CCO Final Balance	Enter	Blank	BAL
*CCO Final Balance (Reopen)	Enter	'Reopen'	BAL

*Source Document Description may be left blank and a standard description will be supplied.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

NOTICE OF POTENTIAL CLAIM

CEM-6201 (REV 3/2001)

FOR STATE USE ONLY

Received by _____ Date _____
(For resident engineer)

TO (resident engineer)	CONTRACT NUMBER	DATE

This is a Notice of Potential Claim for additional compensation under the provisions of Section 9-1.04 of the *Standard Specifications*. **The act of the engineer, or his/her failure to act, or the event, thing, occurrence, or other cause giving rise to the potential claim occurred on**

DATE

The particular circumstances of this potential claim are described in detail as follows:

The reasons for which I believe additional compensation may be due are:

The nature of the costs involved and the amount of the potential claim are described as follows:
(If accurate cost figures are not available, provide an estimate, or describe the types of expenses involved.)

The undersigned originator (Contractor or Subcontractor as appropriate) certifies that the above statements are made in full cognizance of the California False Claims Act, Government Code sections 12650-12655. The undersigned further understands and agrees that this potential claim to be further considered unless resolved, must be restated as a claim in response to the states proposed final estimate in accordance with Section 9-1.07B of the Standard Specifications.

_____
SUBCONTRACTOR or CONTRACTOR
(Circle one)

_____
(Authorized Representative)

For subcontractor notice of potential claim

This notice of potential claim is acknowledged and forwarded by

_____
PRIME CONTRACTOR

_____
(Authorized Representative)

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CEM6201

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONTRACT ACCEPTANCE

CEM 6301 (Rev. 1/2001)

CONTRACT NUMBER	COUNTY, ROUTE, BRIDGE, POST KILOMETERS	FEDERAL NO.

CONTRACTOR NAME AND BUSINESS ADDRESS

CONTRACT DESCRIPTION AND DELIVERY

DESCRIPTION	QUANTITY DELIVERED	UNITS
New Construction		Centerline Kilometers
		Lane Kilometers
		Structures
Reconstruction		Lane Kilometers
		Structures
New HOV		Lane Kilometers
Operations		Lane Kilometers
Rehabilitation		Lane Kilometers
Preservation		Lane Kilometers
Roadside: New Highway Planting		Hectares
Soundwall		Linear Kilometers

CONTRACT WORK WAS SATISFACTORILY COMPLETED _____

Date

CONTRACT ACCEPTANCE IS RECOMMENDED - in accordance with Section 7-1.17, "Acceptance of Contract," of the *Standard Specifications*.

_____

Signature, Resident Engineer

CONTRACT IS ACCEPTED IN ACCORDANCE WITH ABOVE RECOMMENDATION

_____

Date

_____

Signature, District Division Chief
for the Director

CEM-6301

Instructions for Form CEM-6301, *Contract Acceptance*

Contract Description Definitions:

New Construction:

New transportation facility that did not previously exist in the corridor or as the addition of an interchange. Lane kilometers include High Occupancy Vehicles (HOV) lanes.

Reconstruction:

- Addition of a mainline through lane, including HOV lanes
- Significant changes in horizontal and vertical alignment
- Reconstruction of an interchange by adding, moving or relocating ramps
- Replacement of an entire bridge or major portions of an existing bridge on a new vertical or horizontal alignment
- Seismic Retrofit

Operations:

Turnouts, passing lanes, truck climbing lanes

Rehabilitation:

Restoration and replacement of lanes, excluding any major maintenance of lanes (AC overlays greater than 25mm)

Preservation:

Major maintenance and other pavement life extension work (Thin blanket AC overlays 25mm or less, chip seals, slurry seals, etc.)

Roadside-New Highway Planting:

Landscaping

Soundwalls:

Linear kilometers of new soundwall

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

CONSTRUCTION MANUAL PROPOSED CHANGE

CEM-9001 (New 11/1992)

ADA Notice

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CHAPTER	SECTION	PAGE
SUBMITTED BY	DISTRICT/UNIT	DATE

PROPOSED CHANGE

NUMBER OF ATTACHED PAGES

APPROVED BY	APPROVAL DATE

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER **C**

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE

INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB

☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.
DIST. LAB NO.
LOT NO.
SHIPMENT NO.
P.O. OR REQ. NO.
AUTHORIZATION NO.

SAMPLE OF
FOR USE IN
SAMPLE FROM
DEPTH
LOCATION OF SOURCE

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS) | AND IS ON E OF A GROUP OF | SAMPLES REPRESENTING (TONS, GALS, BBLS,

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE | TEST RESULTS DESIRED ☐ NORMAL ☐ PRIORITY | DATE NEEDED

REMARKS

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLED

BY | TITLE

DIST, CO, RTE, PM

LIMITS

CONT. NO.
FED. NO.
RES. ENGR. OR SUPT.
ADDRESS
CONTRACTOR

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

SAMPLE IDENTIFICATION CARD

TL-0101 (REV. 10/97)

CARD NUMBER **C**

☐ PRELIMINARY TESTS
☐ PROCESS TESTS
☐ ACCEPTANCE

INDEPENDENT ASSURANCE TESTS
☐ DIST. LAB
☐ TRANS. LAB

☐ SPECIAL TESTS

SAMPLE SENT TO:
☐ HDQTRS. LAB
☐ BRANCH LAB
☐ DIST. LAB

FIELD NO.
DIST. LAB NO.
LOT NO.
SHIPMENT NO.
P.O. OR REQ. NO.
AUTHORIZATION NO.

SAMPLE OF
FOR USE IN
SAMPLE FROM
DEPTH
LOCATION OF SOURCE

THIS SAMPLE IS SHIPPED IN (NO. CONTAINERS) | AND IS ON E OF A GROUP OF | SAMPLES REPRESENTING (TONS, GALS, BBLS,

OWNER OR MANUFACTURER

TOTAL QUANTITY AVAILABLE | TEST RESULTS DESIRED ☐ NORMAL ☐ PRIORITY | DATE NEEDED

REMARKS

COVER ADDITIONAL INFORMATION WITH LETTER

DATE SAMPLED

BY | TITLE

DIST, CO, RTE, PM

LIMITS

CONT. NO.
FED. NO.
RES. ENGR. OR SUPT.
ADDRESS
CONTRACTOR

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

FIELD SAMPLE OF PORTLAND CEMENT CONCRETE

SAMPLE CARD

TL-0502 (REV. 6/97)

NO.

CONTR. NO | FED NO.

DIST. | CO. | RT. | P.M.

LIMITS OF WORK

RES. ENG. OR SUPT

ADDRESS

CONTRACTOR

SOURCE OF MATERIALS

CEMENT	CERTIFICATE NO.
FINE AGGREGATE	SMARA
COARSE AGGREGATE	SMARA

FIELD SAMPLE NO.	
SIZE OF SPECIMEN - mm	
DATE CAST	
CEMENT - kg/m3	
PERCENT AIR	
KELLY BALL PENETRATION	
WATER - kg/m3	
SAMPLED FROM	
ADMIXTURE	

REMARKS

SAMPLED BY | TITLE

ENCLOSURE WITH SAMPLE

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

FIELD SAMPLE OF PORTLAND CEMENT CONCRETE

SAMPLE CARD

TL-0502 (REV. 6/97)

NO.

CONTR. NO | FED NO.

DIST. | CO. | RT. | P.M.

LIMITS OF WORK

RES. ENG. OR SUPT

ADDRESS

CONTRACTOR

SOURCE OF MATERIALS

CEMENT	CERTIFICATE NO.
FINE AGGREGATE	SMARA
COARSE AGGREGATE	SMARA

FIELD SAMPLE NO.	
SIZE OF SPECIMEN - mm	
DATE CAST	
CEMENT - kg/m3	
PERCENT AIR	
KELLY BALL PENETRATION	
WATER - kg/m3	
SAMPLED FROM	
ADMIXTURE	

REMARKS

SAMPLED BY | TITLE

ENCLOSURE WITH SAMPLE

STATE OF CALIFORNIA·DEPARTMENT OF TRANSPORTATION

JOB CEMENT SAMPLES RECORD

MR 0518 (Rev. 6/93)#CT-7541-6019-0

024070

Note: THIS IS A RECORD OF JOB CEMENT SAMPLES SHIPPED TO THE LABORATORY BY THE RESIDENT ENGINEER.

DISTRICT	COUNTY	ROUTE	P.M.

CONTRACT OR W.O. NUMBER

CONTRACTOR

RESIDENT ENGINEER	PHONE NUMBER

ADDRESS

SAMPLE REPRESENTS *(bbl.)*	TYPE *(Circle one.)* I II III IV V 1P N F C
BRAND	☐ Mineral admixture ☐ Cement

MILL OR SOURCE LOCATION

TYPE WORK

Certificate of Compliance Received From *(name)*	MILL OR SOURCE
	READY-MIX MANUFACTURER
	CONCRETE PRODUCTS MANUFACTURER

CERTIFICATE OF COMPLIANCE NUMBERS

SAMPLED BY *(print)*	DATE SAMPLED

REMARKS

White--*Enclose with sample*
Yellow--*For Resident Engineer*

G920167 93 96159

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PRODUCT, MATERIAL, OR METHOD REPORT
(For Highway Planting or Erosion Control)

LA - 16 (REV 04/2001)

Purpose of Report: _____

LOCATION	DISTRICT	COUNTY	ROUTE	P.M. OR STA. AT EACH LOCATION

INSTALLED BY	CONTRACT NUMBER	MAINTENANCE OR OTHER

DATE INSTALLED	COSTS	PLANS ATTACHED ☐ YES ☐ NO

Evalution and Comments: _____

FINANCIAL SAVINGS	ADDITIONAL EVALUATION REQUIRED ☐ YES ☐ NO

If yes, state reason: _____

INITIATED BY	DEPARTMENT	PHONE

REVIEWED BY	DEPARTMENT	PHONE

Send copy to:

California Department of Transportation
Office of State Landscape Architecture, MS 28
Standards Branch
1120 N Street, Sacramento, CA 95814

DATE

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

REPORT OF CHEMICAL SPRAY OPERATIONS

LA-17 (REV 04/2001)

REPORT OF CHEMICAL SPRAY OPERATIONS

CONTRACTOR	WEEK ENDING DATE	PROJECT DESCRIPTION	PROJECT NUMBER

	A	B	C	D
CHEMICAL MIXTURE AND PERCENT ACTIVE MATERIAL				
WATER RATE				
APPLICATION PER SQUARE FOOT OR ACRE				

CHECK PROPER BOX												PLANTING SPRAYED						PEST KILLED					DESCRIPTION OF AREA (STA., LOOP, ETC.)
							CHEMICAL USED																
DAY	WINDY	CALM	A.M.	P.M.	CLOUDY	SUNNY	A	B	C	D		TREES	SHRUBS	IVY	ICE PLANT	GROUNDCOVER		GRASS	BROADLEAF	STOLONS	SCALE, MOTH, ETC.	DISEASE	
MON																							
TUE																							
WED																							
THU																							
FRI																							
SAT																							

RESIDENT ENGINEER COMMENTS:

CONTRACTOR'S REPRESENTATIVE

COPY TO: DISTRICT _____ MAINTENANCE FOR FILE

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STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

NOTICE OF CHANGE IN CLEARANCE OR BRIDGE WEIGHT RATING

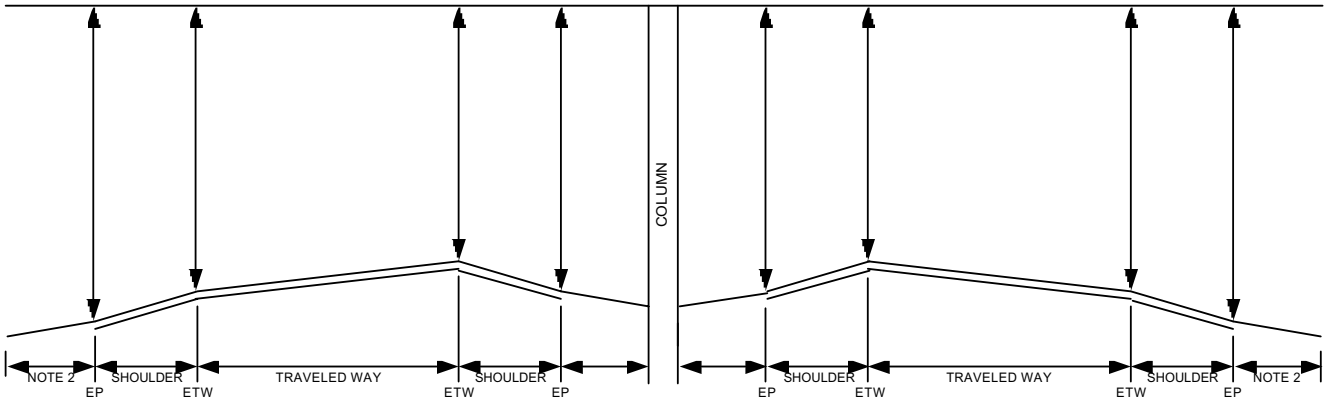
TR-0019 (NEW 6/2000)

PLEASE FAX THIS FORM TO: NORTH REGION CONST/MAINT LIAISON (916) 322-4081
SOUTH REGION CONST/MAINT LIAISON (909) 383-4296

BRIDGE NAME			BRIDGE NUMBER	DATE
DISTRICT	COUNTY	ROUTE	PM	CITY
SUBMITTED BY		PHONE NUMBER		FAX NUMBER
TYPE OF CHANGE (SELECT ONE) ☐ PERMANENT ☐ TEMPORARY (SEE NOTE 1)		TENTATIVE START DATE		TENTATIVE END DATE
BRIDGE WEIGHT RATING CHANGE (SELECT ONE) ☐ YES ☐ NO		EXISTING BRIDGE WEIGHT RATING		NEW BRIDGE WEIGHT RATING

CLEARANCE DIAGRAM

BRIDGE NAME



_____ BOUND _____ BOUND

LOOKING AHEAD ON _____
(ROUTE)

NOTES:

1) FOR TEMPORARY VERTICAL CLEARANCE CHANGES, DIMENSIONS ARE TO BOTTOM OF FALSEWORK
2) INCLUDE DISTANCE TO ANY OBSTRUCTION (i.e. -GUARDRAIL, COLUMNS, K-RAIL)

FOR LIAISON USE ONLY:

DATE RECEIVED BY LIAISON	DATE OF RCD/TRD CHANGE	LIAISON SIGNATURE

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

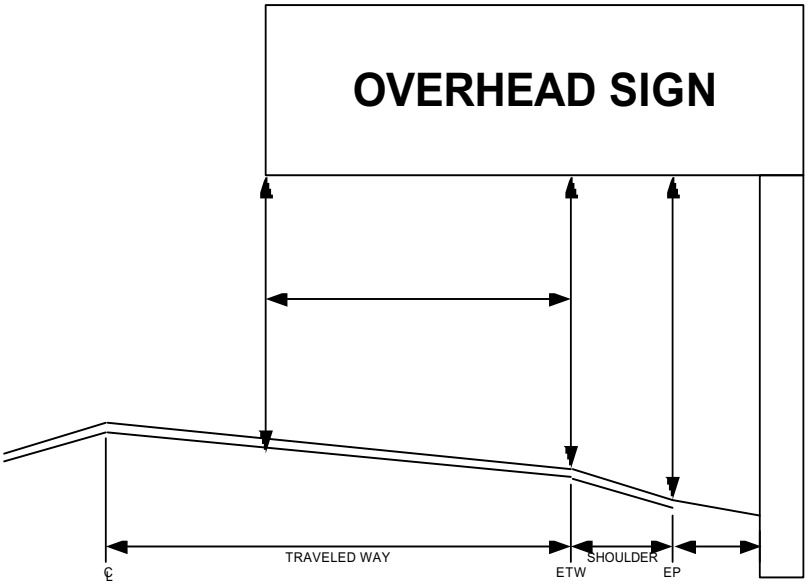
NOTICE OF CHANGE IN VERTICAL OR HORIZONTAL CLEARANCE

TR-0020 (NEW 6/2000)

PLEASE FAX THIS FORM TO: NORTH REGION CONST/MAINT LIAISON (916) 322-4081
SOUTH REGION CONST/MAINT LIAISON (909) 383-4296

SIGN NAME			SIGN NUMBER	DATE
DISTRICT	COUNTY	ROUTE	PM	CITY
SUBMITTED BY		PHONE NUMBER		FAX NUMBER

CLEARANCE DIAGRAM



NOT TO SCALE

LOOKING _____ ON _____
(DIRECTION) (ROUTE)

☐ MAINLINE ☐ RAMP

FOR LIAISON USE ONLY:

DATE RECEIVED BY LIAISON	DATE OF RCD/TRD CHANGE	LIAISON SIGNATURE

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

NOTICE OF CHANGE IN CLEARANCE OR BRIDGE WEIGHT RATING

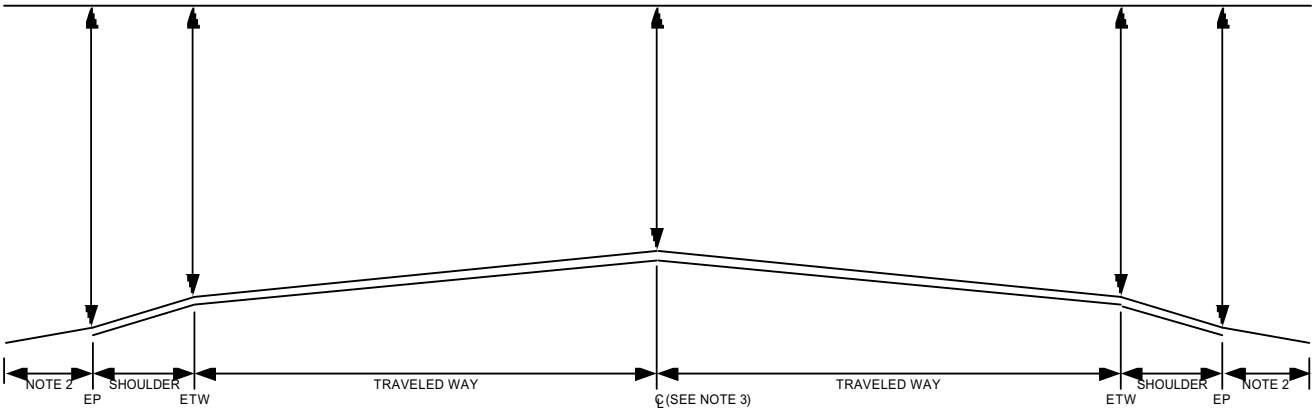
TR-0029 (NEW 6/2000)

PLEASE FAX THIS FORM TO: NORTH REGION CONST/MAINT LIAISON (916) 322-4081
SOUTH REGION CONST/MAINT LIAISON (909) 383-4296

BRIDGE NAME		BRIDGE NUMBER		DATE
DISTRICT	COUNTY	ROUTE	PM	CITY
SUBMITTED BY		PHONE NUMBER		FAX NUMBER
TYPE OF CHANGE (SELECT ONE) ☐ PERMANENT ☐ TEMPORARY (SEE NOTE 1)		TENTATIVE START DATE		TENTATIVE END DATE
BRIDGE WEIGHT RATING CHANGE (SELECT ONE) ☐ YES ☐ NO		EXISTING BRIDGE WEIGHT RATING		NEW BRIDGE WEIGHT RATING

CLEARANCE DIAGRAM

BRIDGE NAME



NOT TO SCALE

LOOKING _____ ON _____
(DIRECTION) (ROUTE)

☐ MAINLINE ☐ RAMP

NOTES:

1) FOR TEMPORARY VERTICAL CLEARANCE CHANGES, DIMENSIONS ARE TO BOTTOM OF FALSEWORK
2) INCLUDE DISTANCE TO ANY OBSTRUCTION (i.e. -GUARDRAIL, COLUMNS, K-RAIL)
3) FOR DIVIDED HIGHWAYS, USE FORM NUMBER TR-0019

FOR LIAISON USE ONLY:

DATE RECEIVED BY LIAISON	DATE OF RCD/TRD CHANGE	LIAISON SIGNATURE